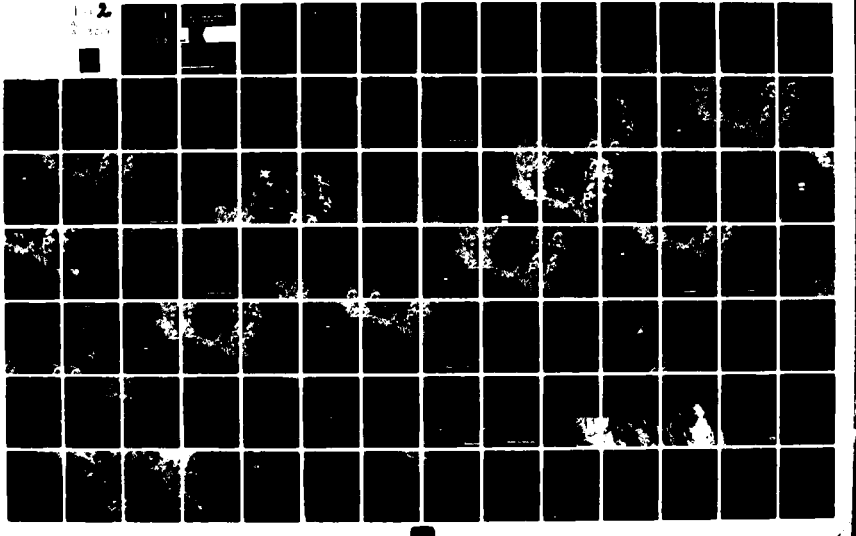
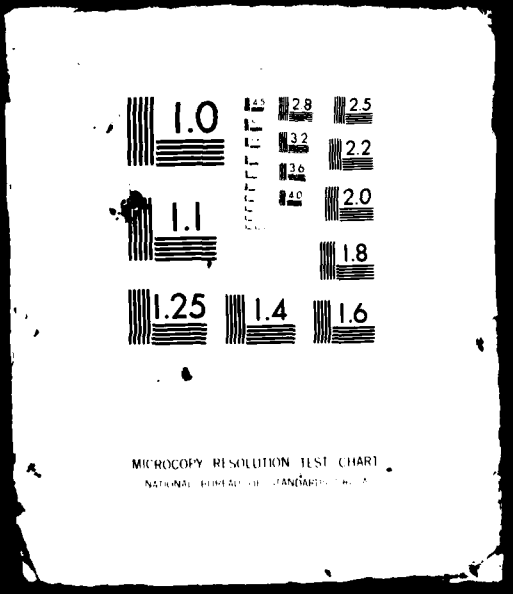
AD-A113 219 FUGRO NATIONAL INC .LONG BEACH CA F/G 8/7
MX SITING INVESTIGATION. GEOTECHNICAL SITING STATUS REPORT. VOL--ETC(U)
JUN 78
UNCLASSIFIED FN-78-JUN-II-VOL-2 NL



1 OF 2
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STATUS REPORT

MX

VOLUME 2

MX SITING INVESTIGATION GEOTECHNICAL SITING STATUS REPORT

VOLUME 2

21 JUNE 1978

TUDRO NATIONAL, INC.

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2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER

4. TITLE *(and Subtitle)*: MX siting investigation Geotechnical siting Status Report Volume 2
5. TYPE OF REPORT & PERIOD COVERED: Final
6. PERFORMING ORG. REPORT NUMBER: FN T[redacted] 78-JON II

7. AUTHOR(s): Fugro National, Inc.
8. CONTRACT OR GRANT NUMBER(s)

9. PERFORMING ORGANIZATION NAME AND ADDRESS: Ertec Western Inc. (formerly Fugro National) P.O. Box 7765 Long Beach Ca 90807
10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: 64312 F

11. CONTROLLING OFFICE NAME AND ADDRESS: U.S. Department of the Air Force Space and Missile Systems Organization Norton AFB Ca 92409 (SAMSO)
12. REPORT DATE: 21 Jun 78
13. NUMBER OF PAGES

14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*
15. SECURITY CLASS. *(of this report)*
15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*: Distribution Unlimited

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*: Distribution Unlimited

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*: ~~Coarse Screening~~, Location maps, Aggregate ~~Resources~~ ~~Map~~ Basement, geology, screening

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*: Volume II, M-X Siting Status Report: Aggregate location Maps for New Mexico-Texas, Arizona-California and Nevada-California; Well location Map-San Cristobal Valley, Arizona; Geological Map, Activities Location Map, Soil profile Map and Depth to Basement Map for Lechuguilla Desert, Arizona.

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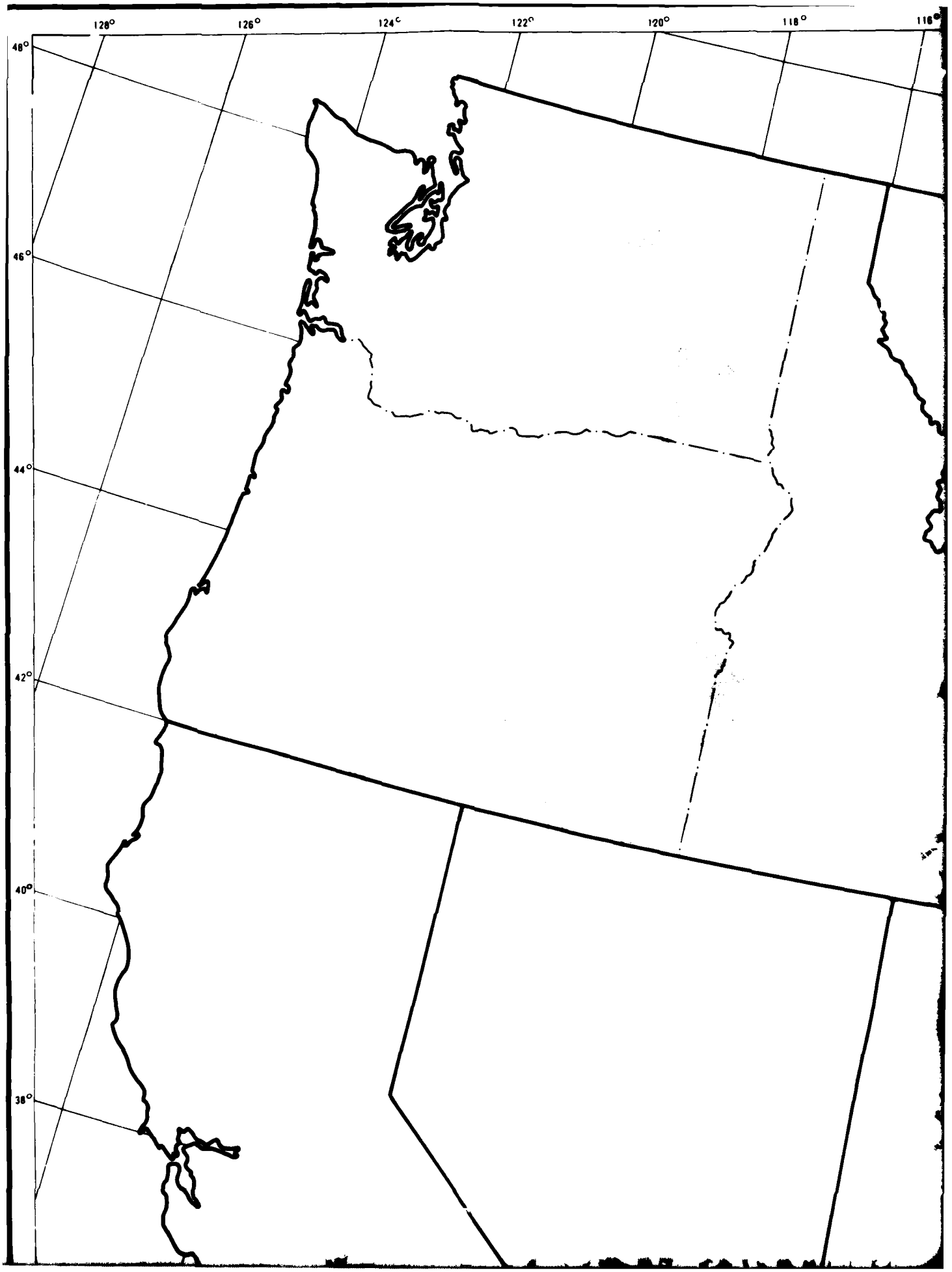
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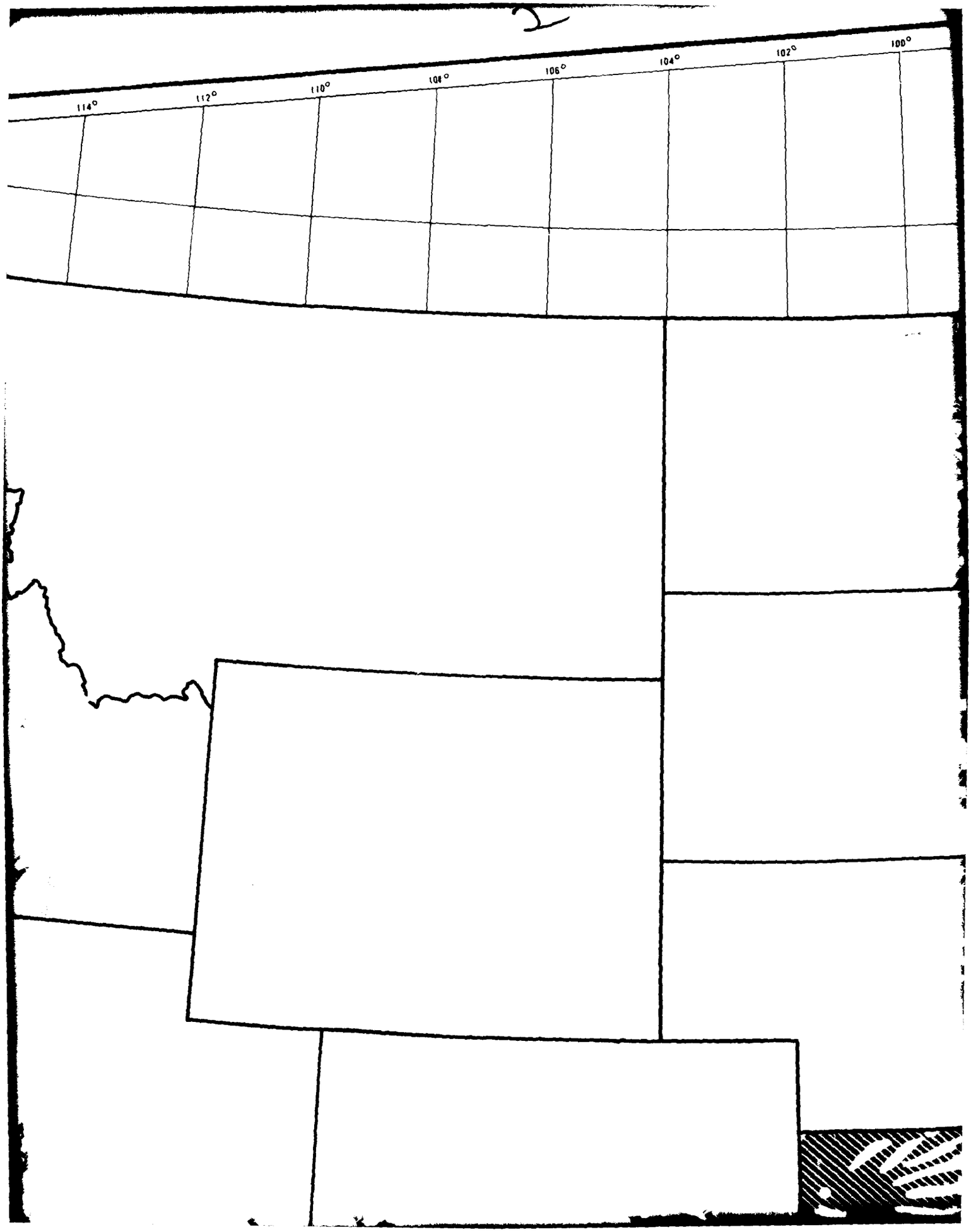
Volume II

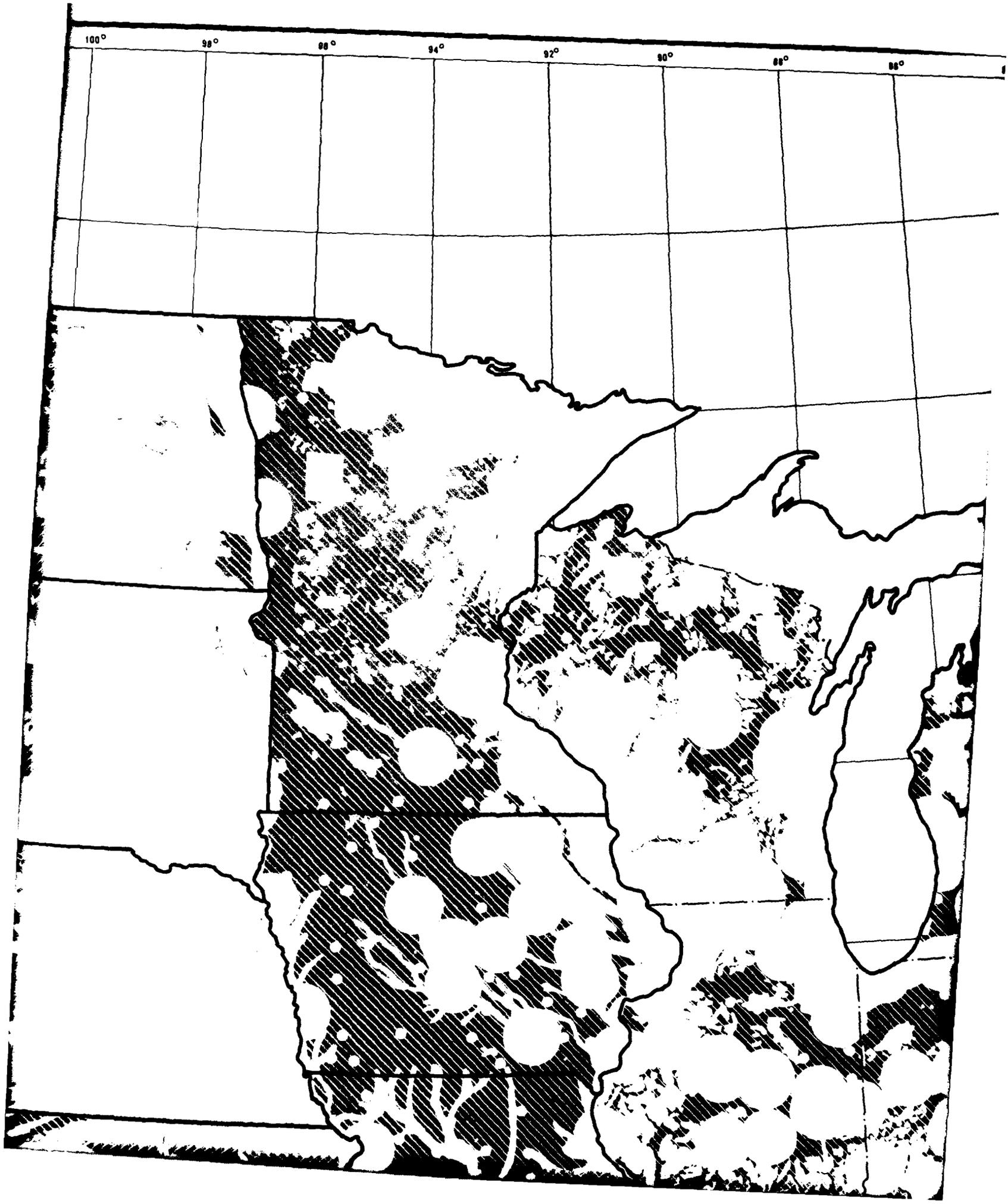
LIST OF DRAWINGS

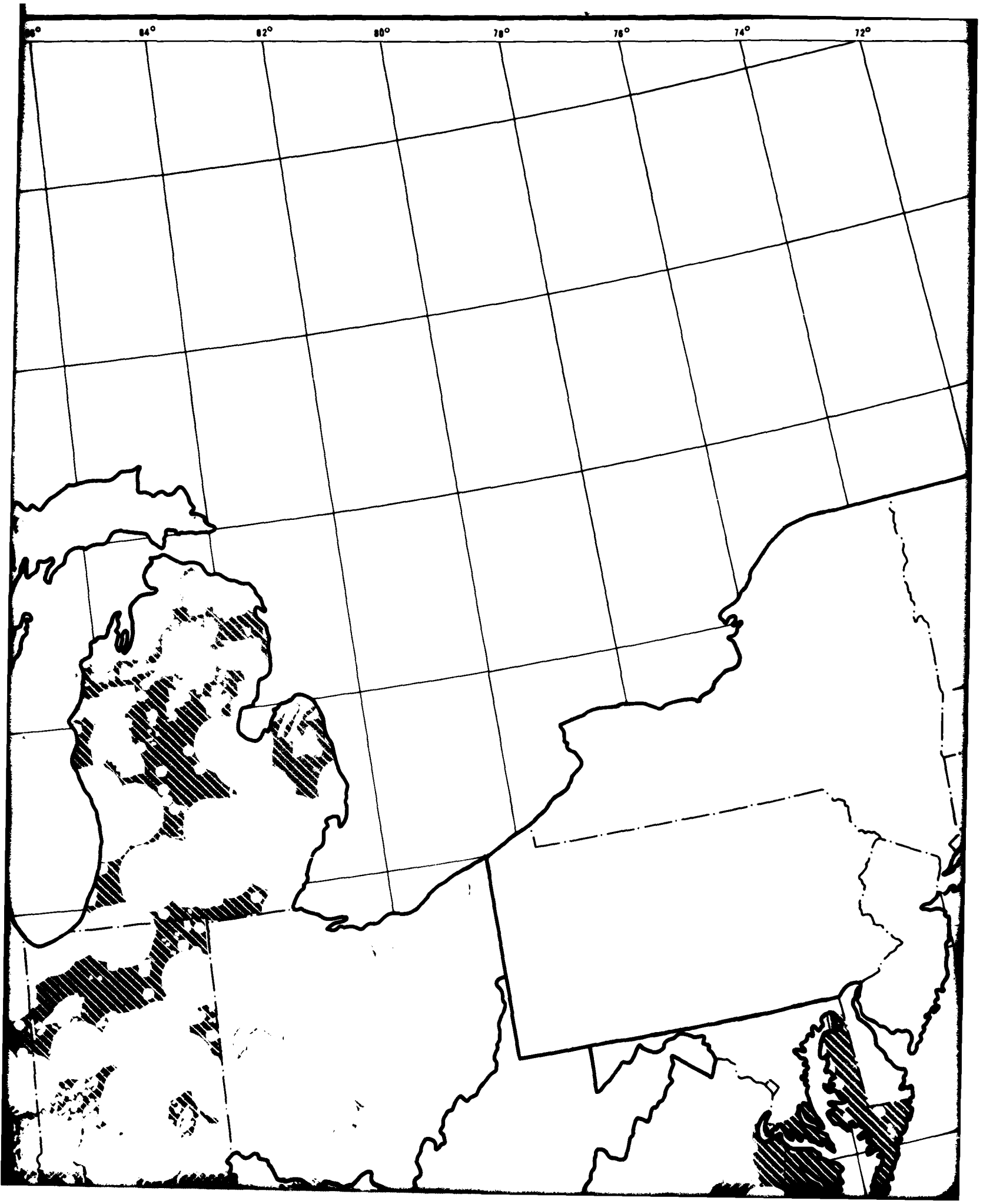
TEXT DRAWINGS

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2.2-A	Intermediate Screening
2.2-B	Intermediate Screening
2.3-A	Fine Screening
2.3-B	Fine Screening-Rock/Water Depth Evaluation
3.5-A	Activities Location Map, Lechuguilla Desert, Arizona
3.5-B	Geologic Map, Lechuguilla Desert, Arizona
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5.1-D	Well Location Map and Lines of Equal Elevation of Ground Water in Wells, July 1977, San Cristobal Valley, Arizona

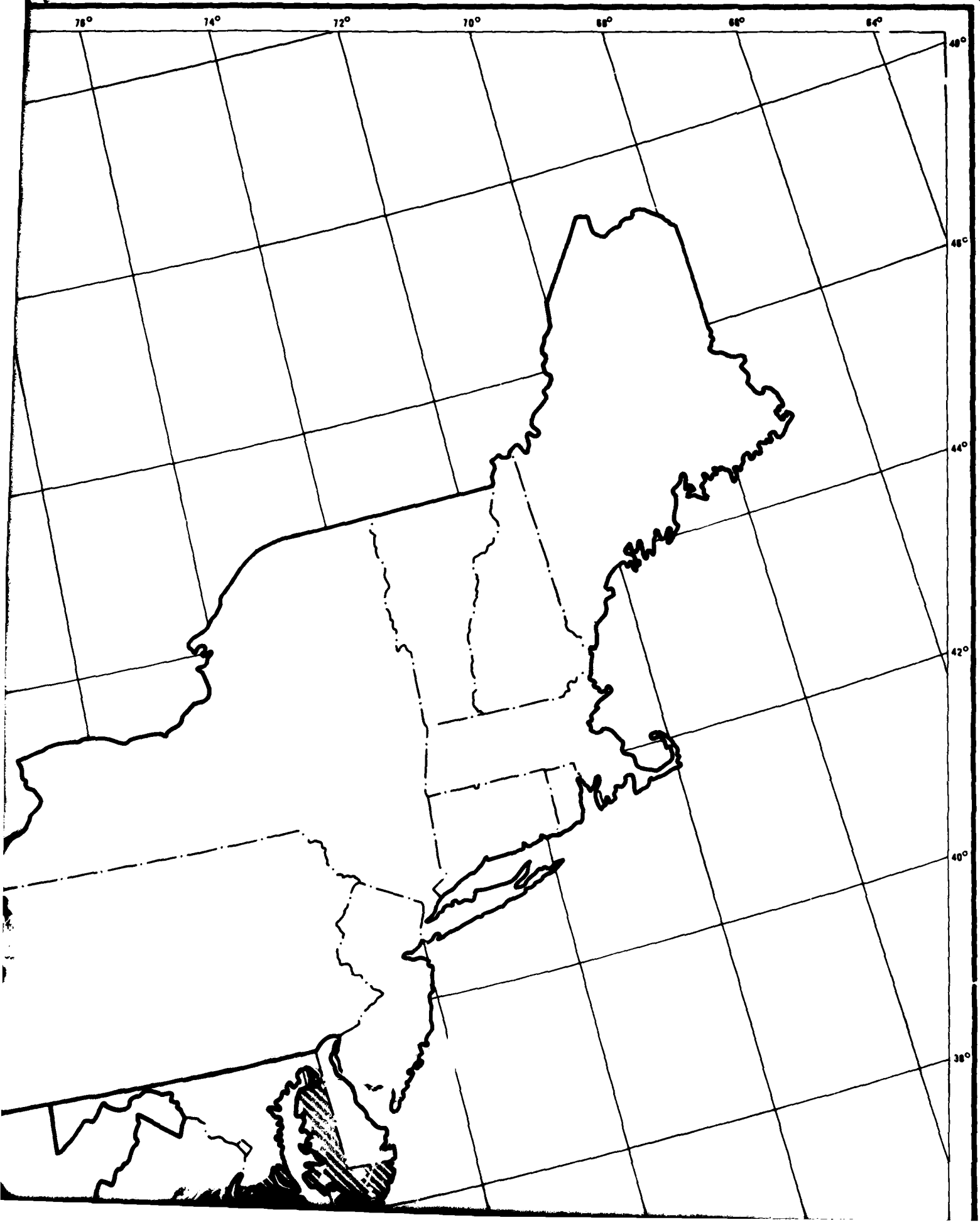

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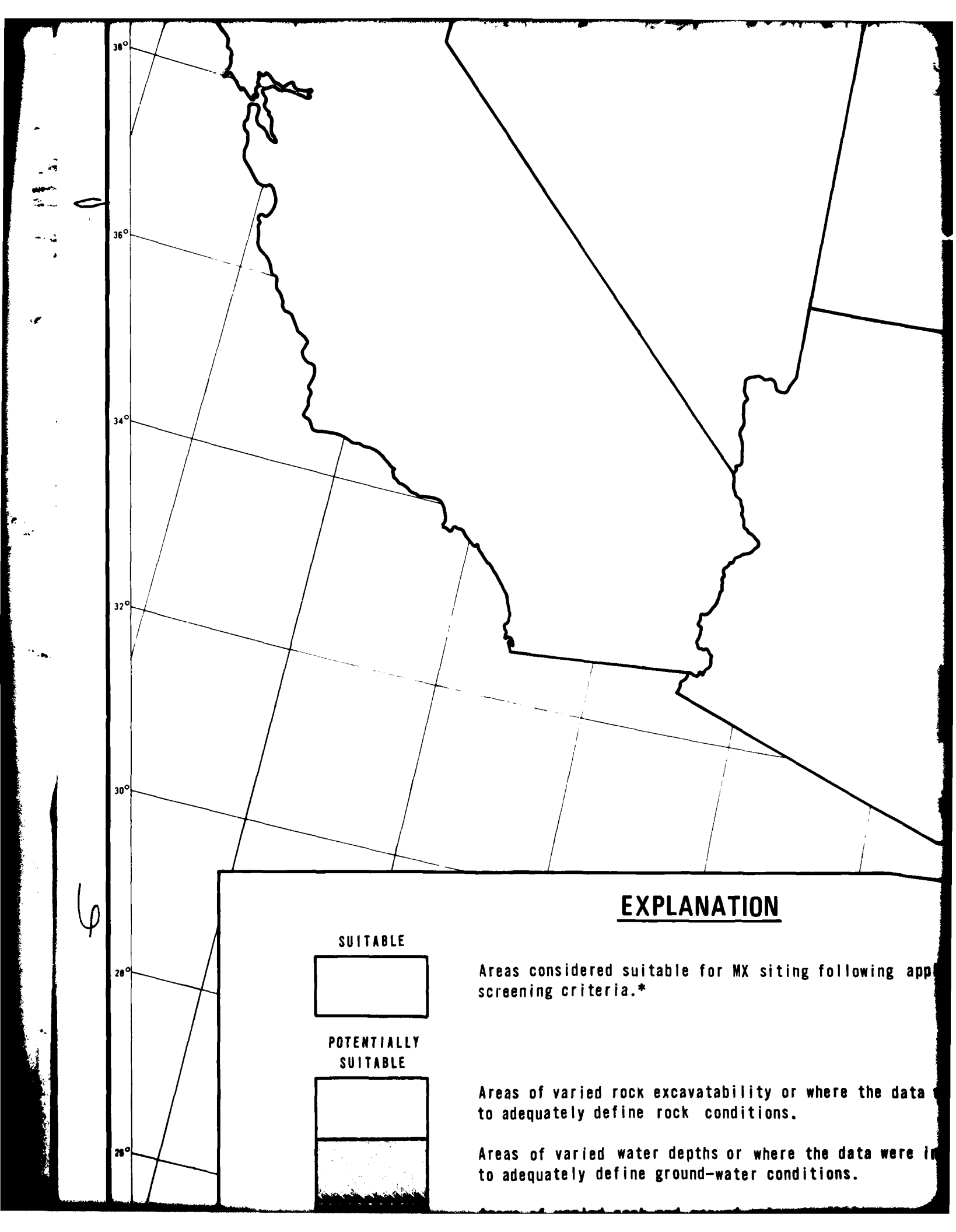

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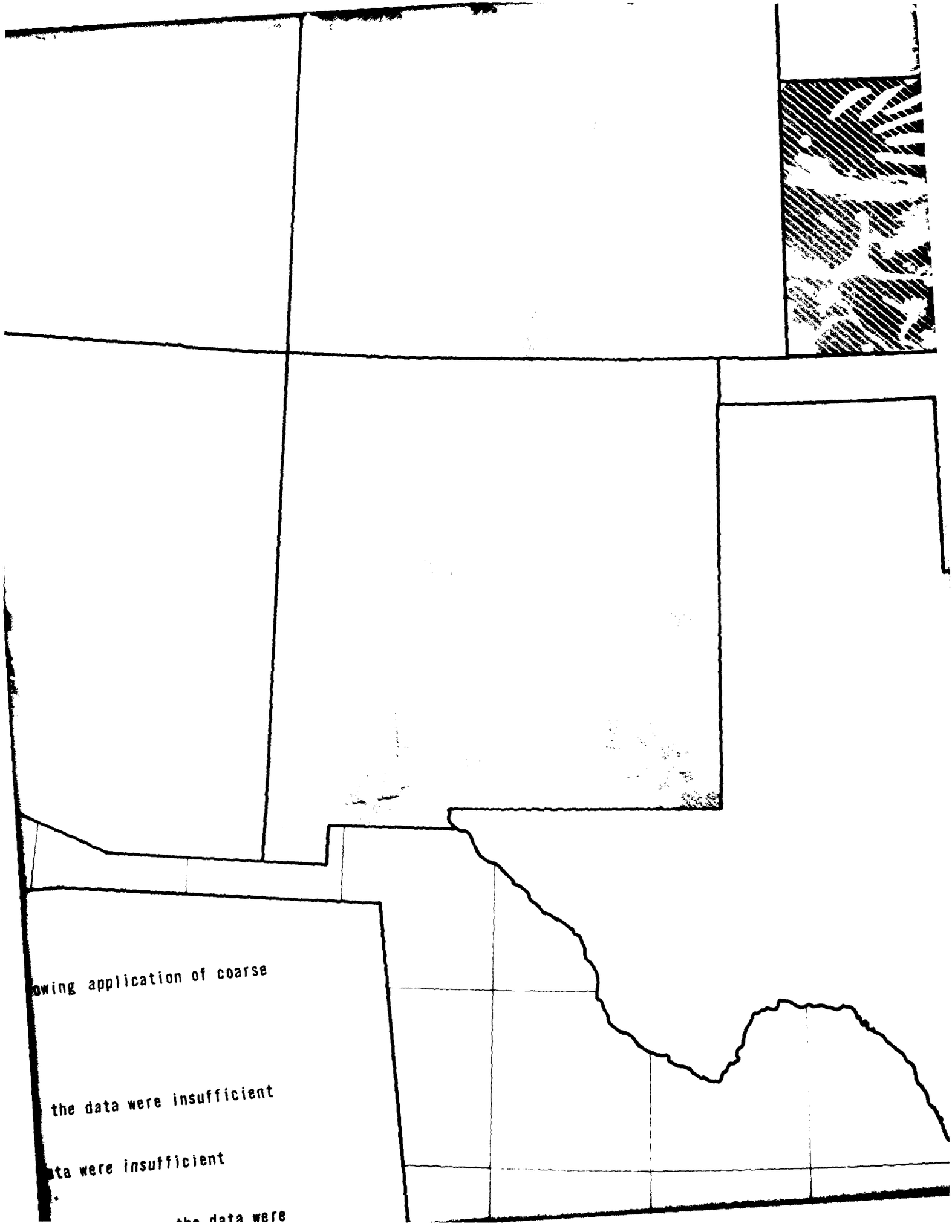

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COARSE SCREENING
DRAWING 2.1-A




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EXPLANATION
SUITABLE
Areas considered suitable for MX siting following appl
screening criteria.*
POTENTIALLY
SUITABLE
Areas of varied rock excavatability or where the data
to adequately define rock conditions.
Areas of varied water depths or where the data were i
to adequately define ground-water conditions.



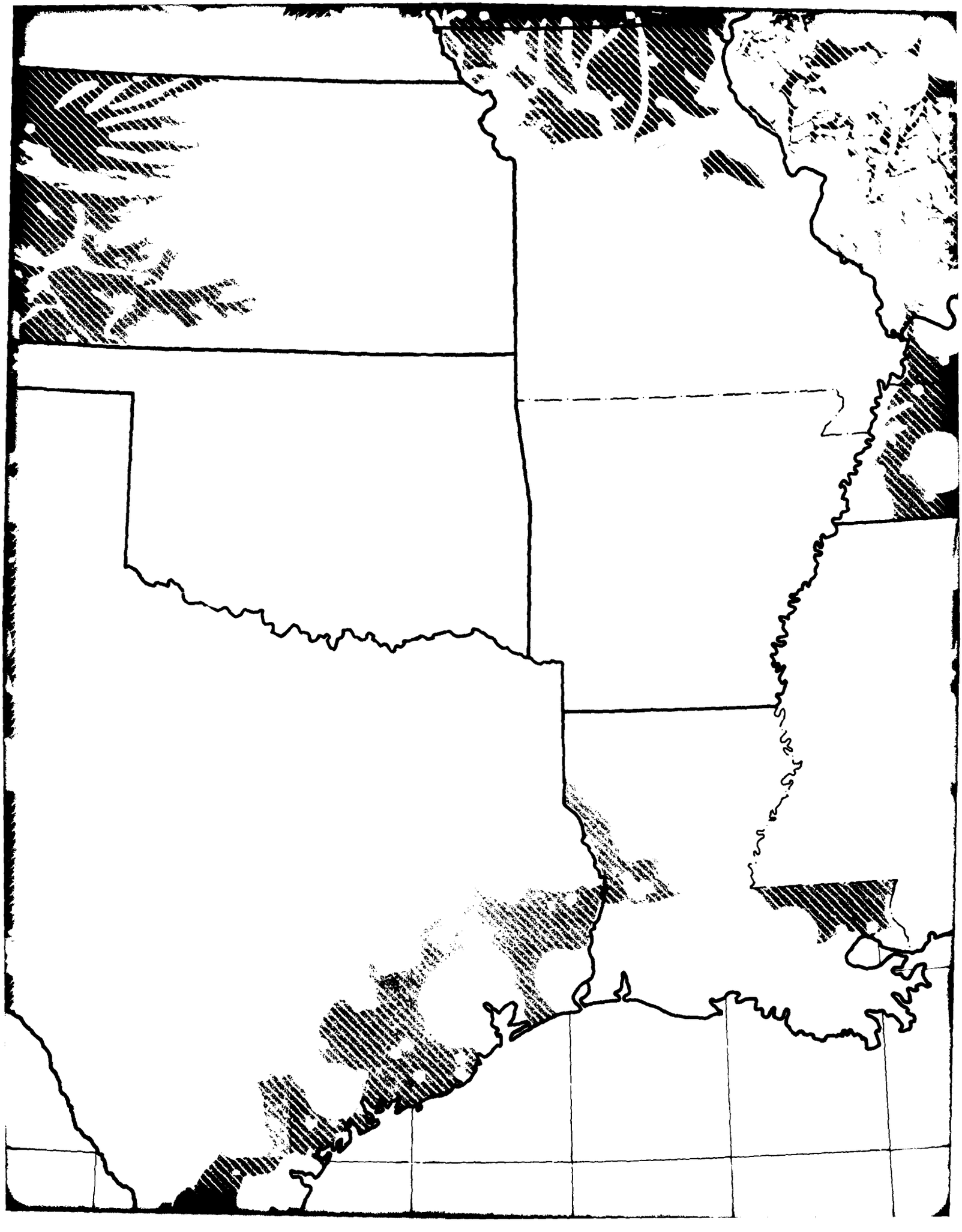
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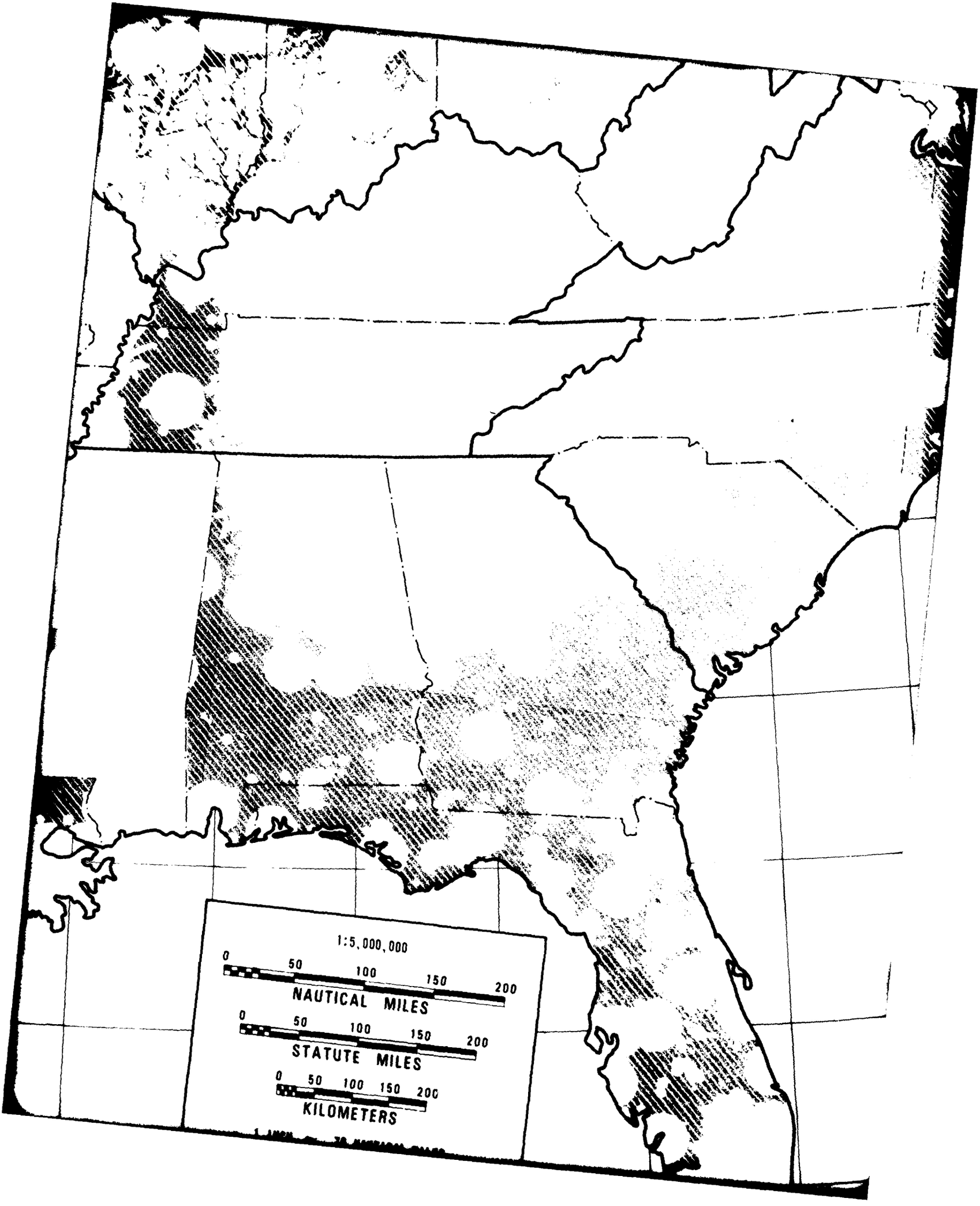
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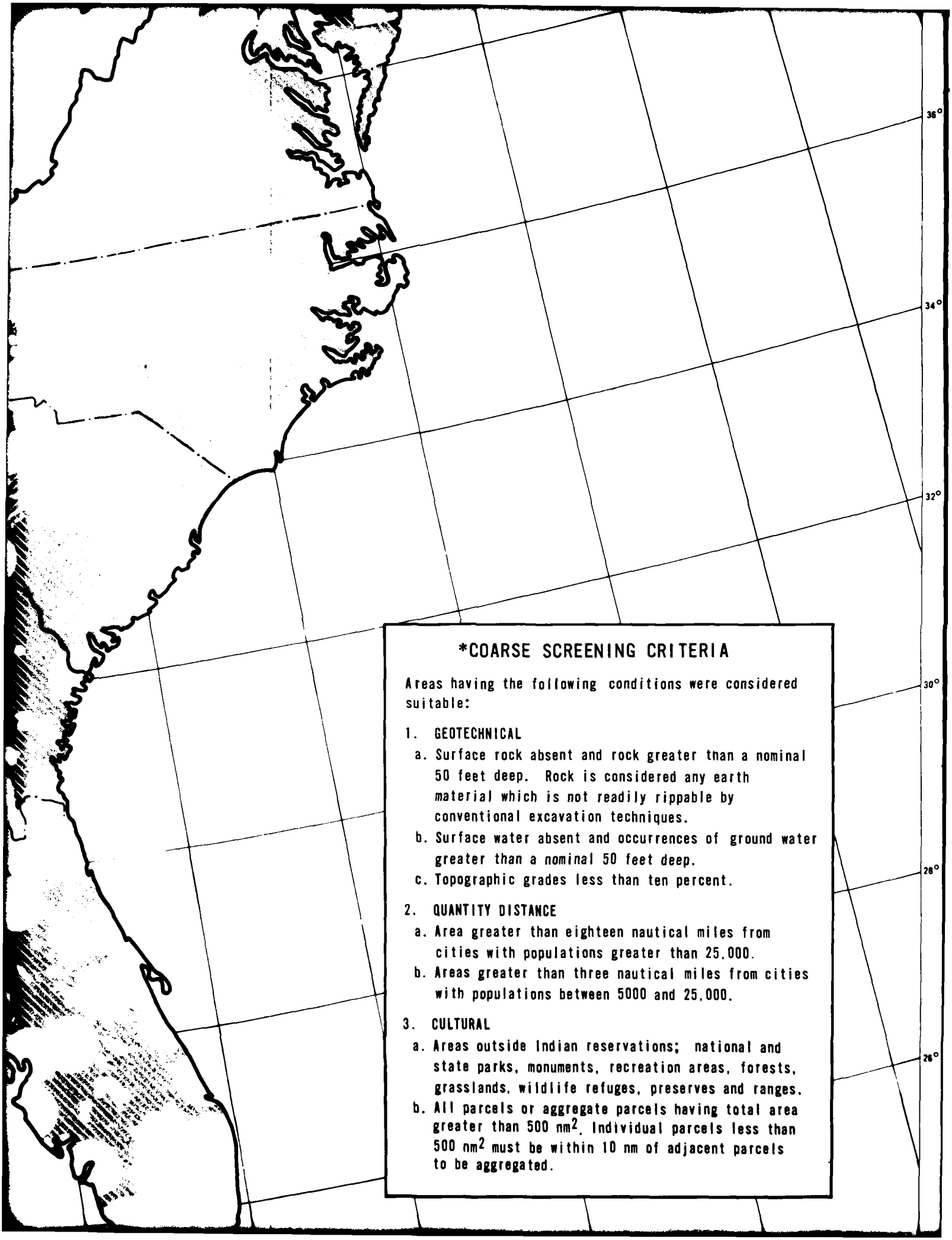
ta were insufficient

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STATUTE MILES
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KILOMETERS



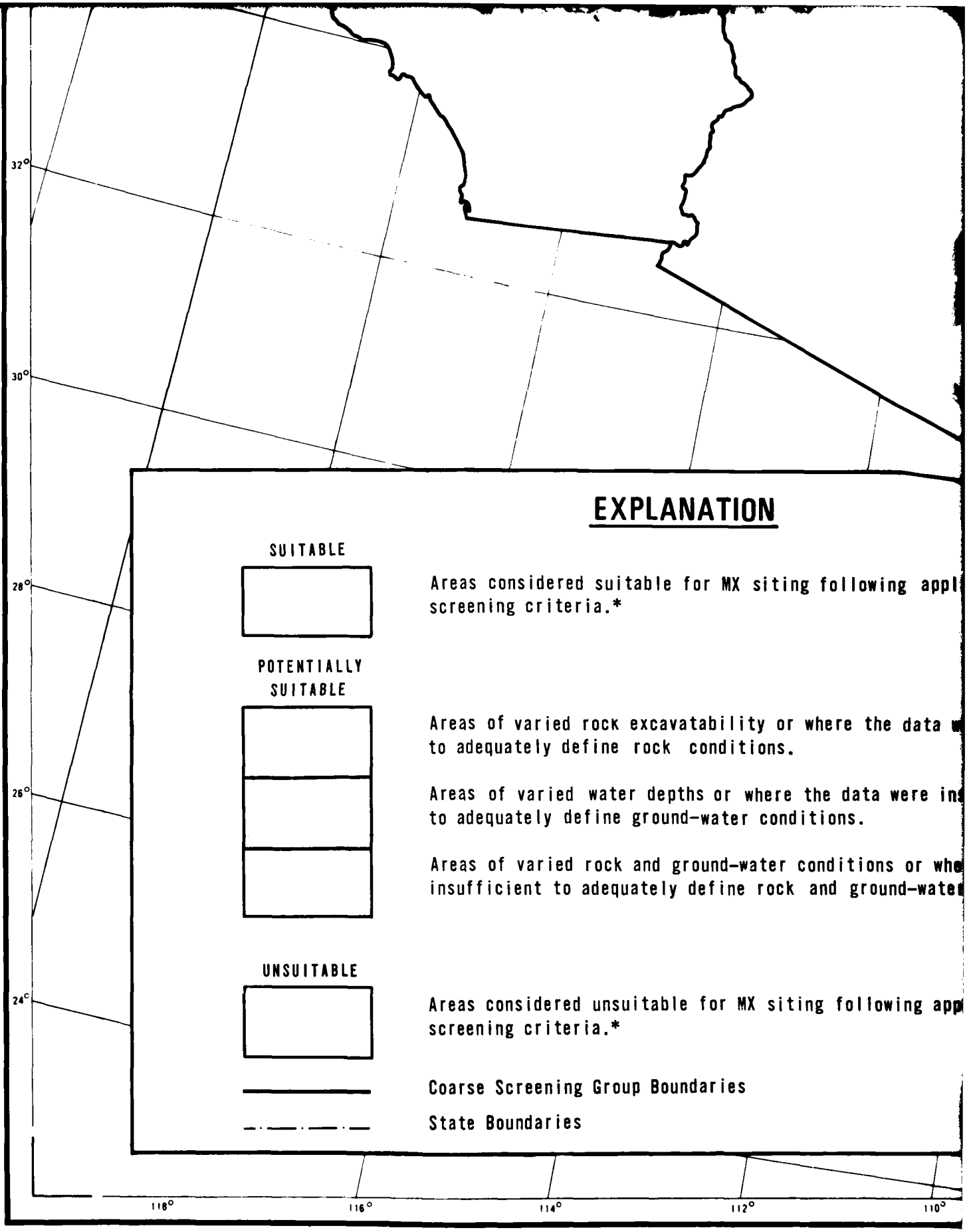
*COARSE SCREENING CRITERIA

Areas having the following conditions were considered suitable:

1. GEOTECHNICAL
   a. Surface rock absent and rock greater than a nominal 50 feet deep. Rock is considered any earth material which is not readily rippable by conventional excavation techniques.
   b. Surface water absent and occurrences of ground water greater than a nominal 50 feet deep.
   c. Topographic grades less than ten percent.

2. QUANTITY DISTANCE
   a. Area greater than eighteen nautical miles from cities with populations greater than 25,000.
   b. Areas greater than three nautical miles from cities with populations between 5000 and 25,000.

3. CULTURAL
   a. Areas outside Indian reservations; national and state parks, monuments, recreation areas, forests, grasslands, wildlife refuges, preserves and ranges.
   b. All parcels or aggregate parcels having total area greater than 500 nm^2. Individual parcels less than 500 nm^2 must be within 10 nm of adjacent parcels to be aggregated.



EXPLANATION

SUITABLE

Areas considered suitable for MX siting following appli screening criteria.*

POTENTIALLY SUITABLE

Areas of varied rock excavatability or where the data w to adequately define rock conditions.

Areas of varied water depths or where the data were ins to adequately define ground-water conditions.

Areas of varied rock and ground-water conditions or whe insufficient to adequately define rock and ground-water

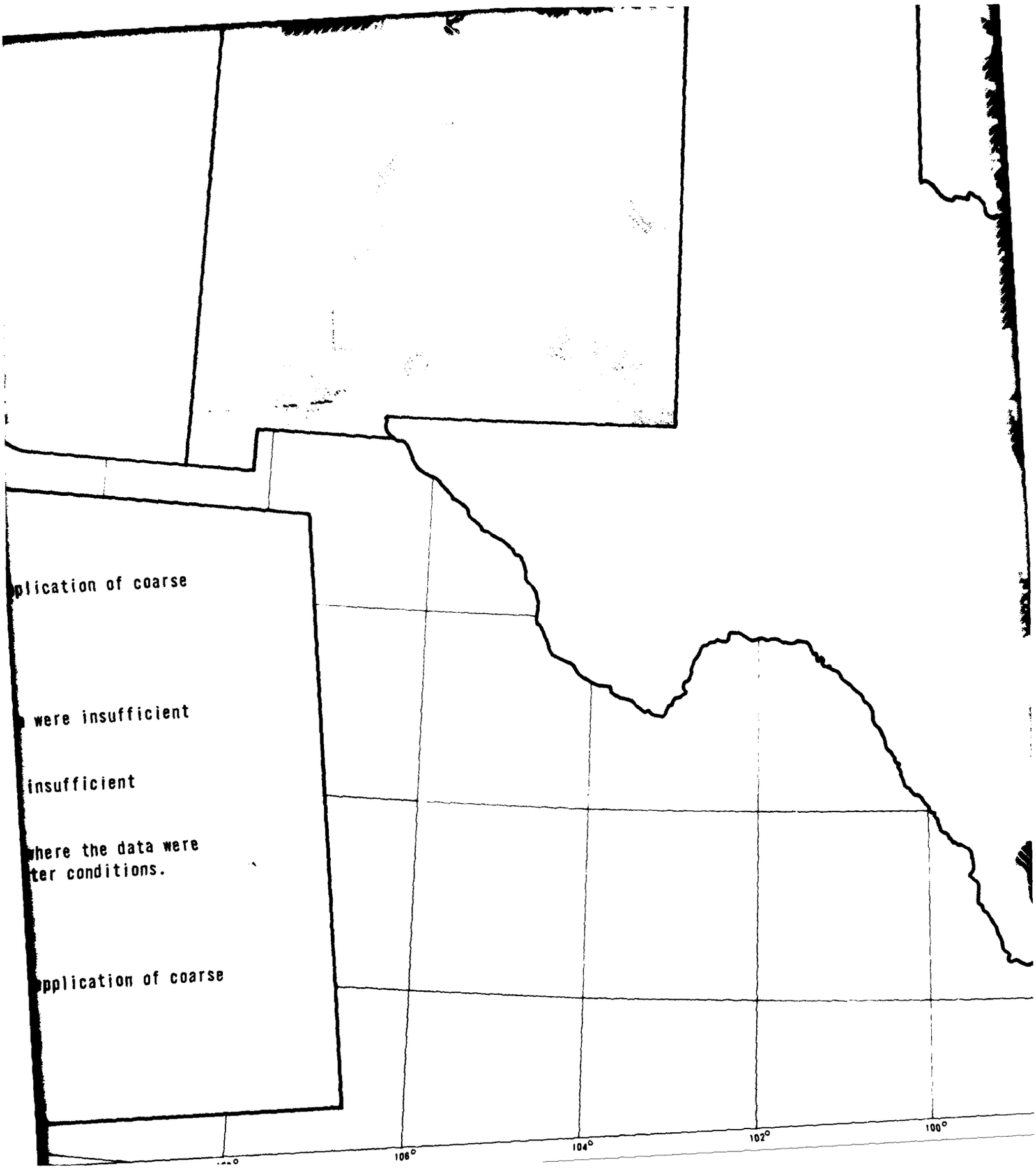
UNSUITABLE

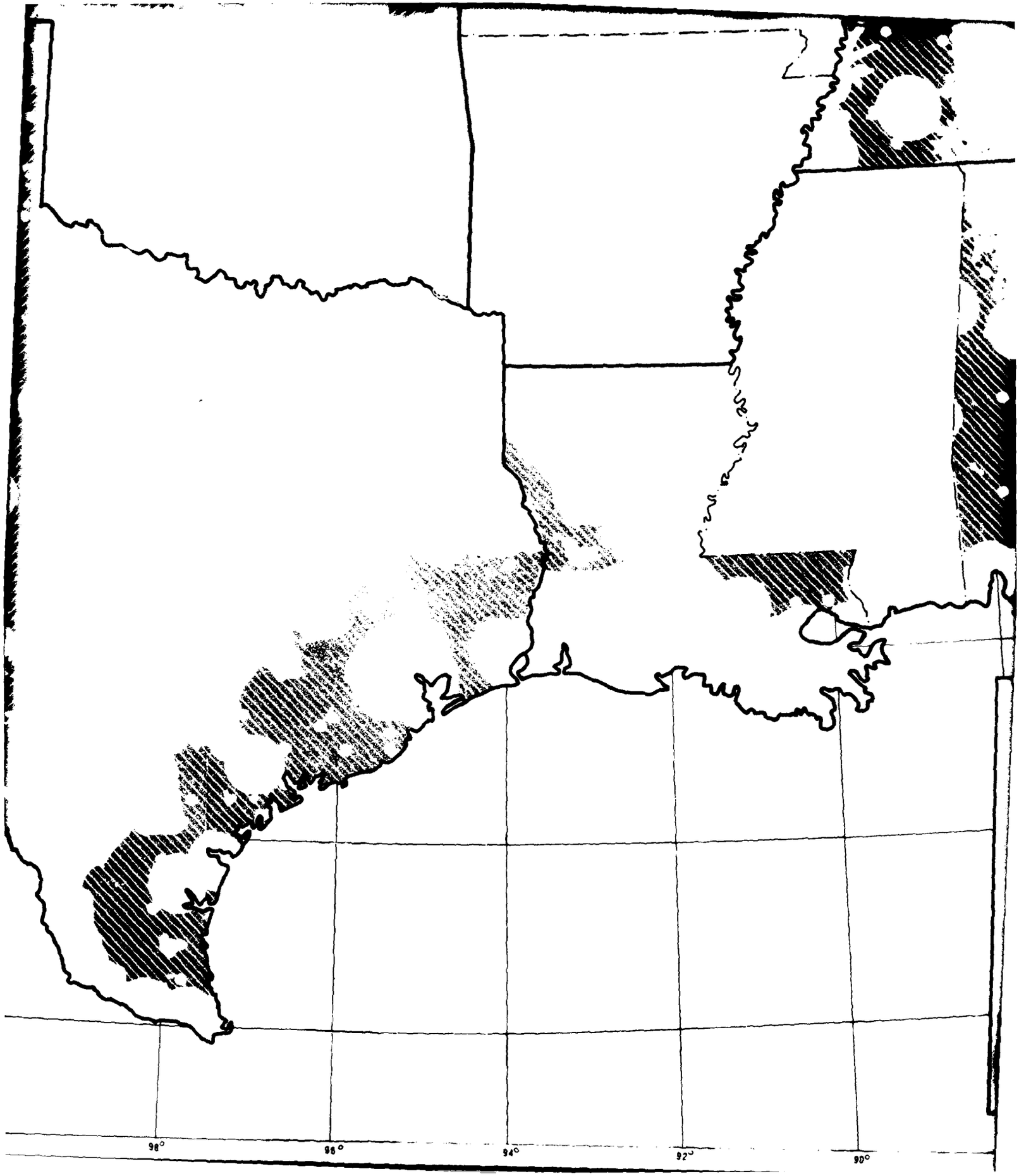
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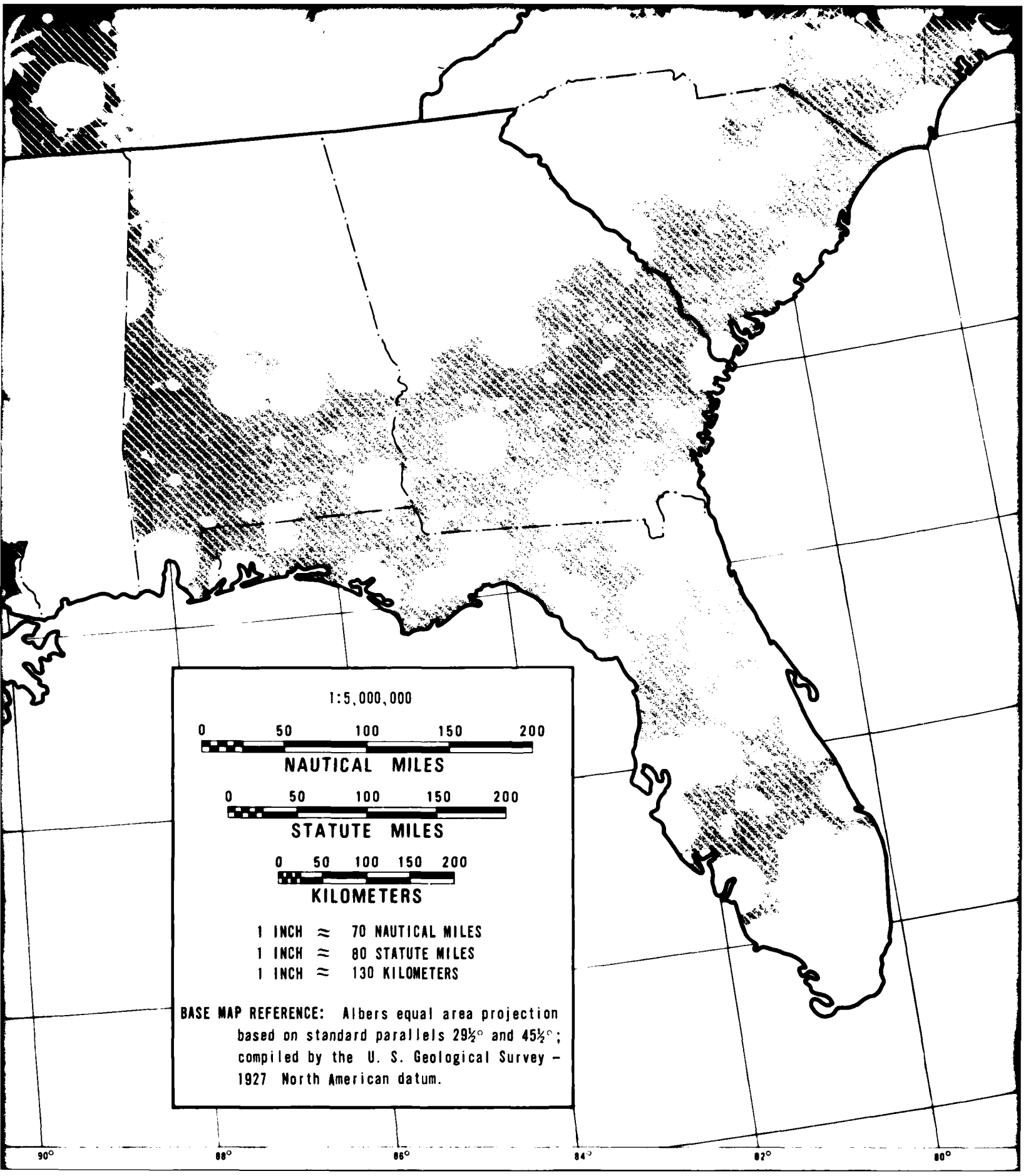
Coarse Screening Group Boundaries

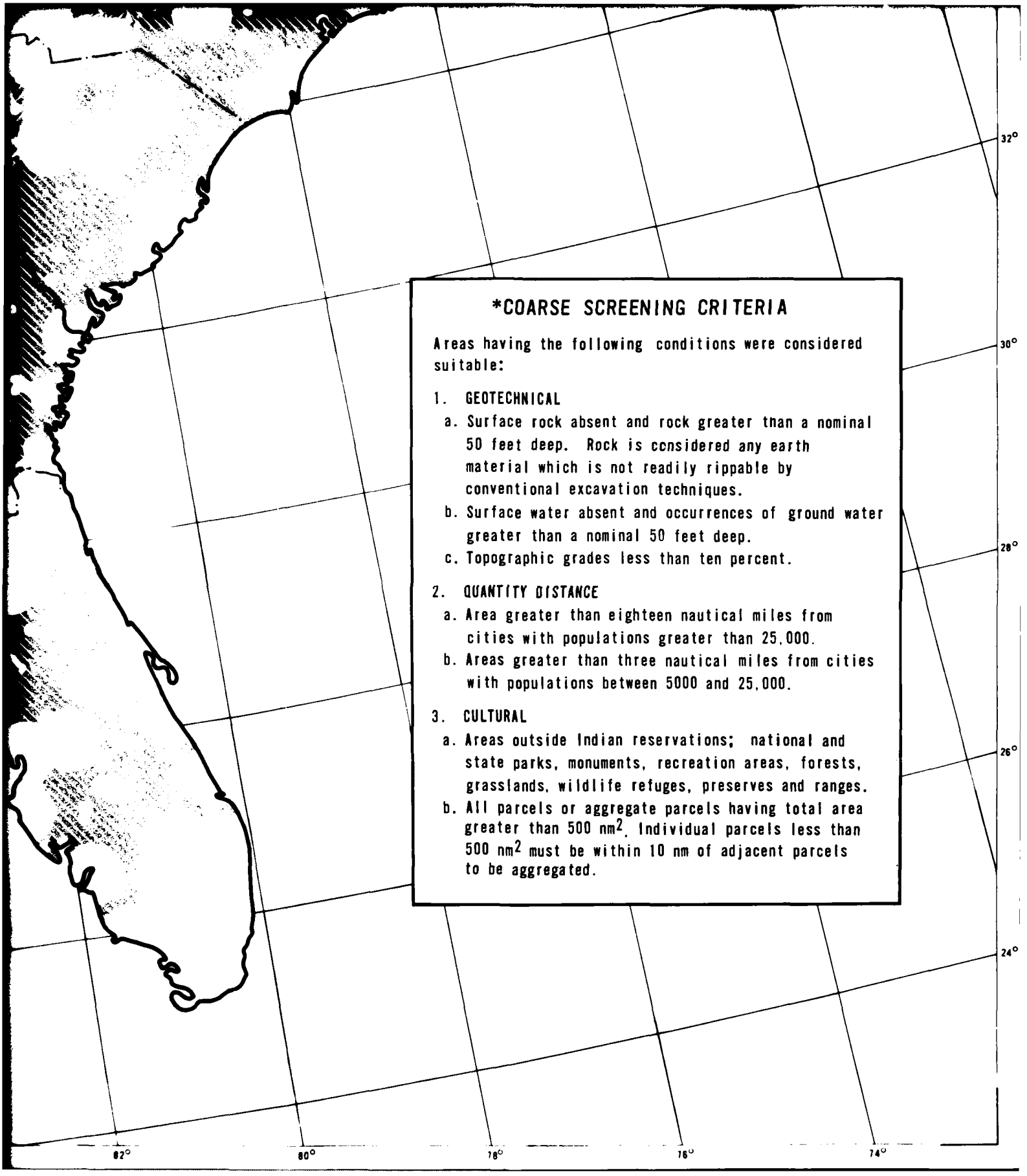
State Boundaries

FN-TR-16


plication of coarse
were insufficient
insufficient
where the data were
ter conditions.
pplication of coarse
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100°


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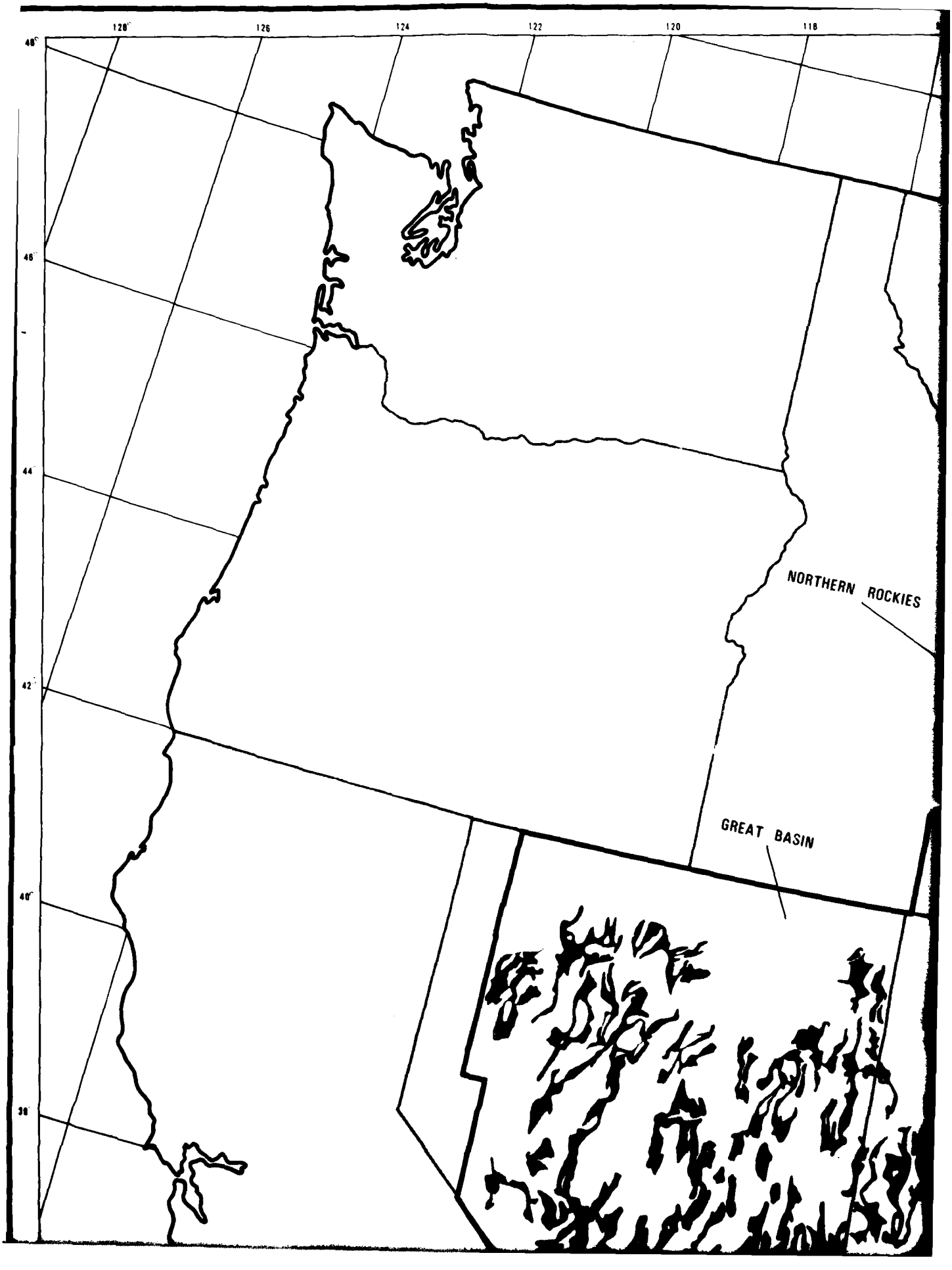

1:5,000,000
0 50 100 150 200
NAUTICAL MILES
0 50 100 150 200
STATUTE MILES
0 50 100 150 200
KILOMETERS
1 INCH ≈ 70 NAUTICAL MILES
1 INCH ≈ 80 STATUTE MILES
1 INCH ≈ 130 KILOMETERS
BASE MAP REFERENCE: Albers equal area projection based on standard parallels 29½° and 45½°; compiled by the U. S. Geological Survey – 1927 North American datum.
90°
88°
86°
84°
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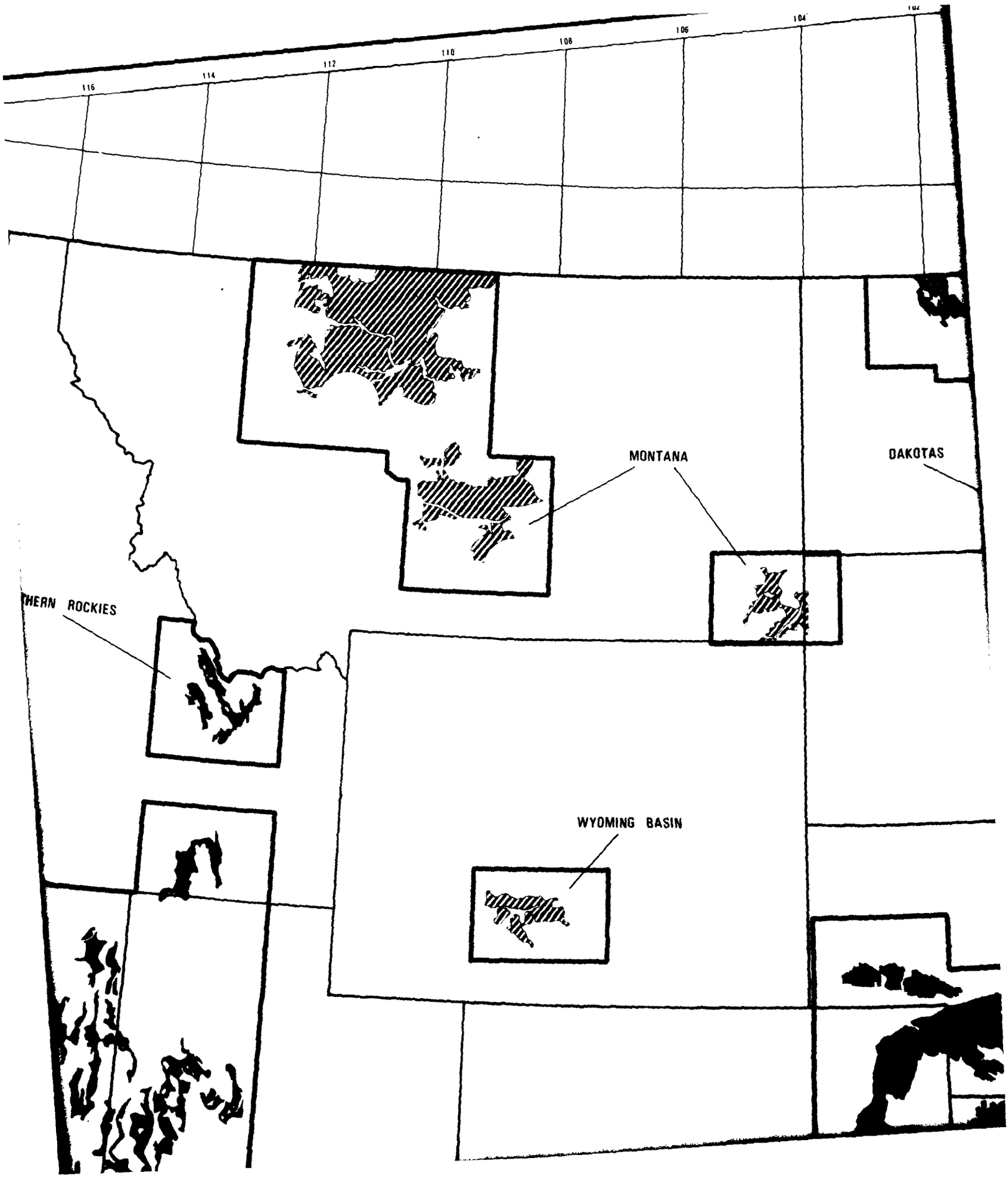


*COARSE SCREENING CRITERIA

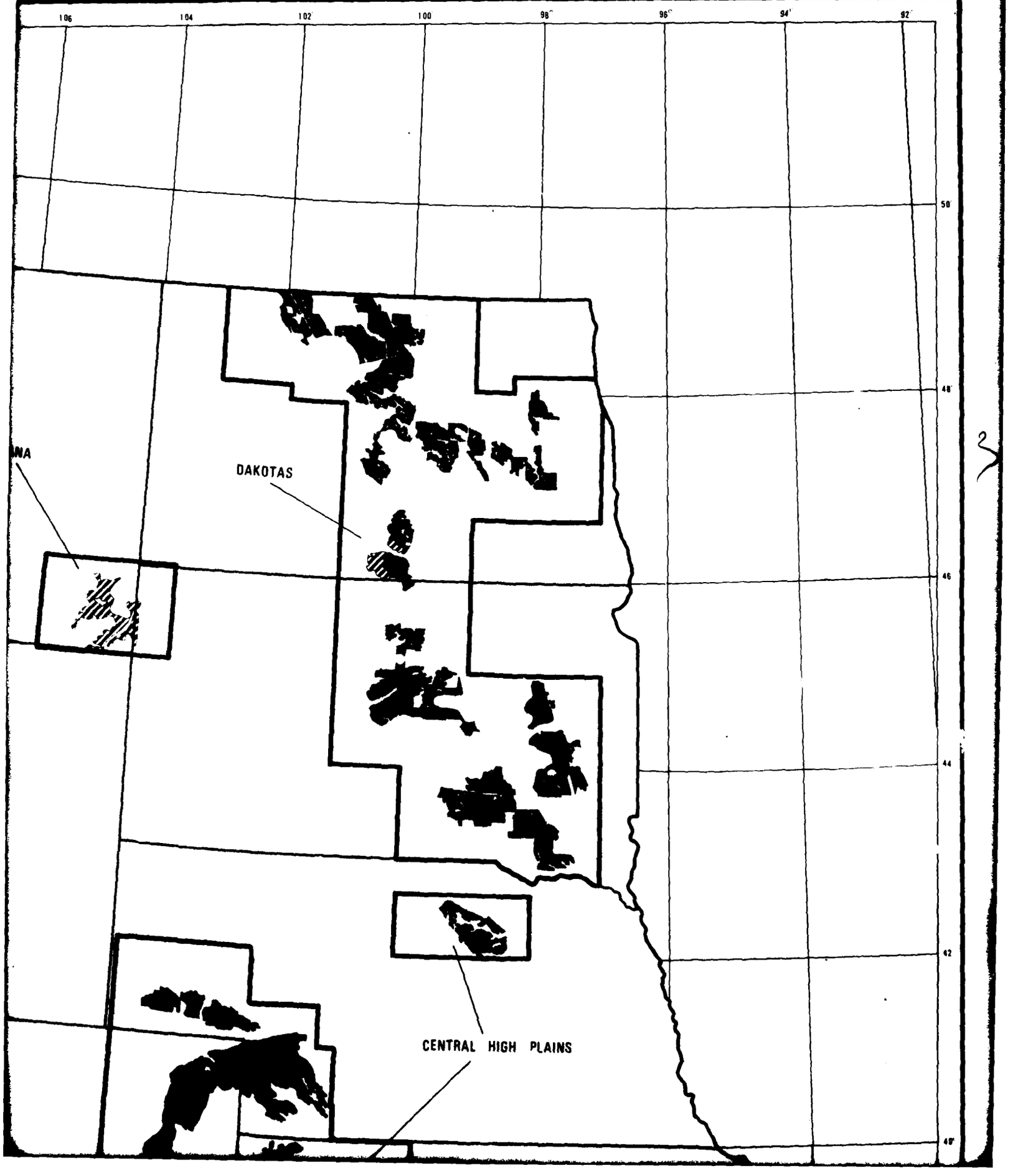
Areas having the following conditions were considered suitable:

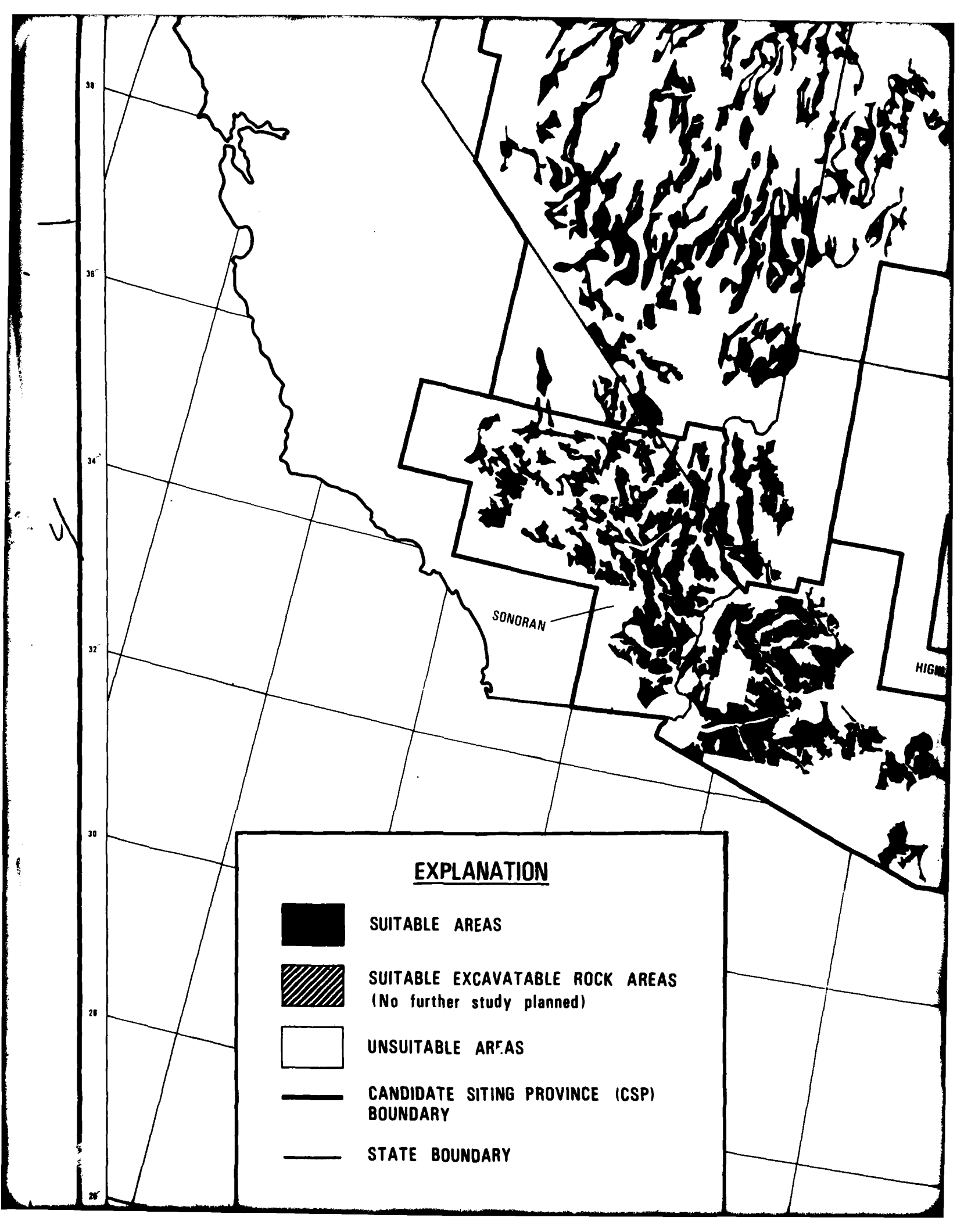
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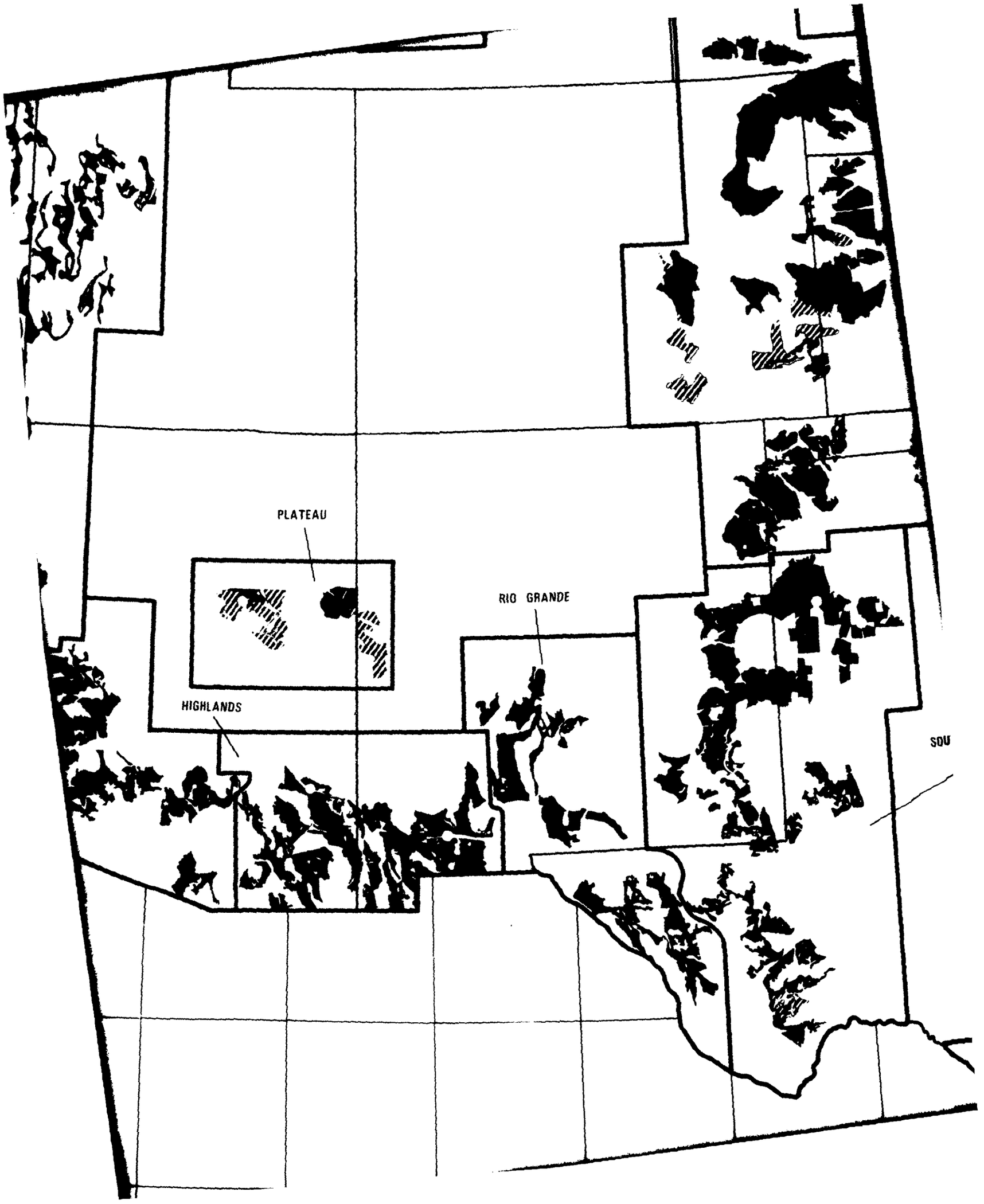

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NORTHERN ROCKIES
GREAT BASIN

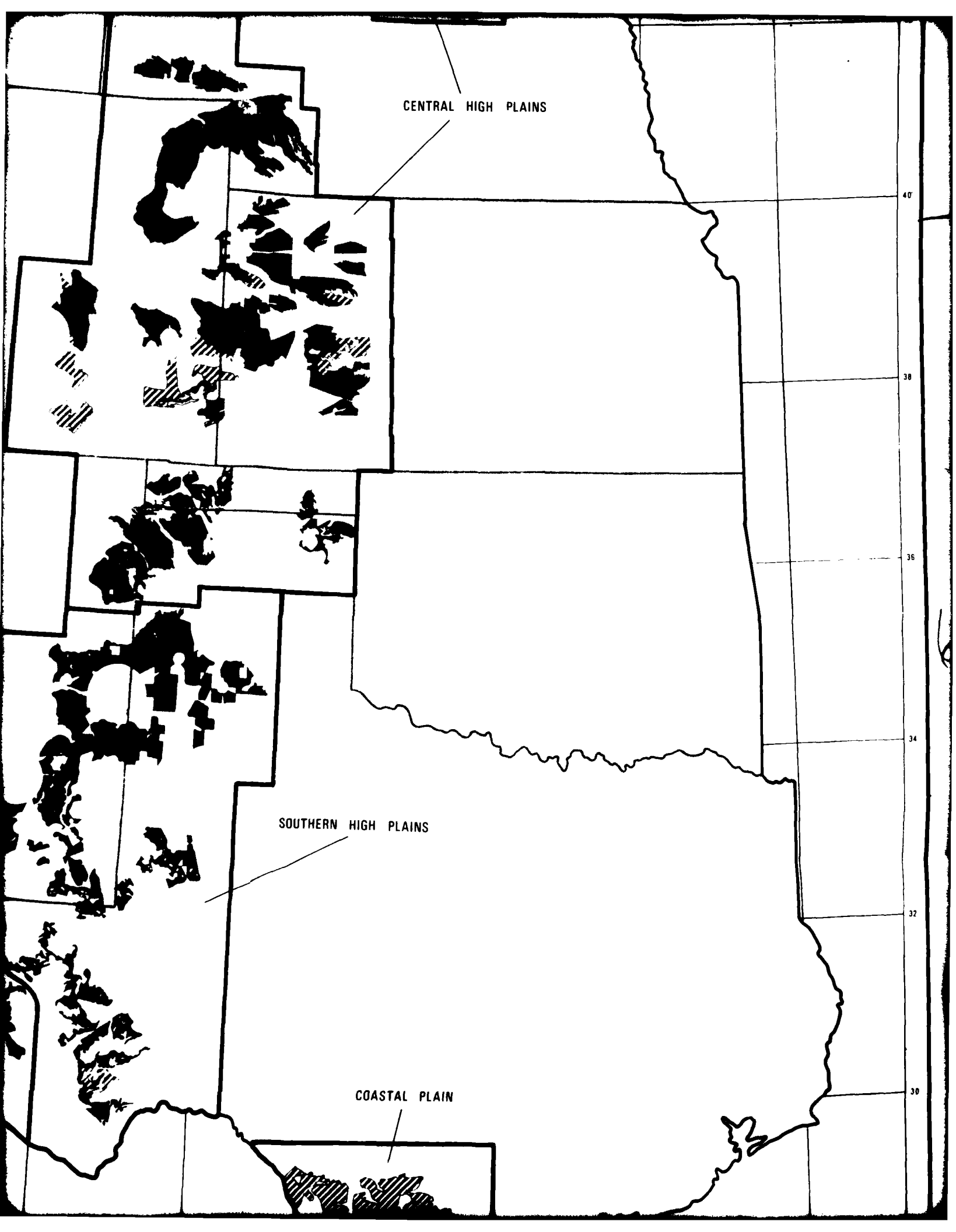

116
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MONTANA
DAKOTAS
THERN ROCKIES
WYOMING BASIN

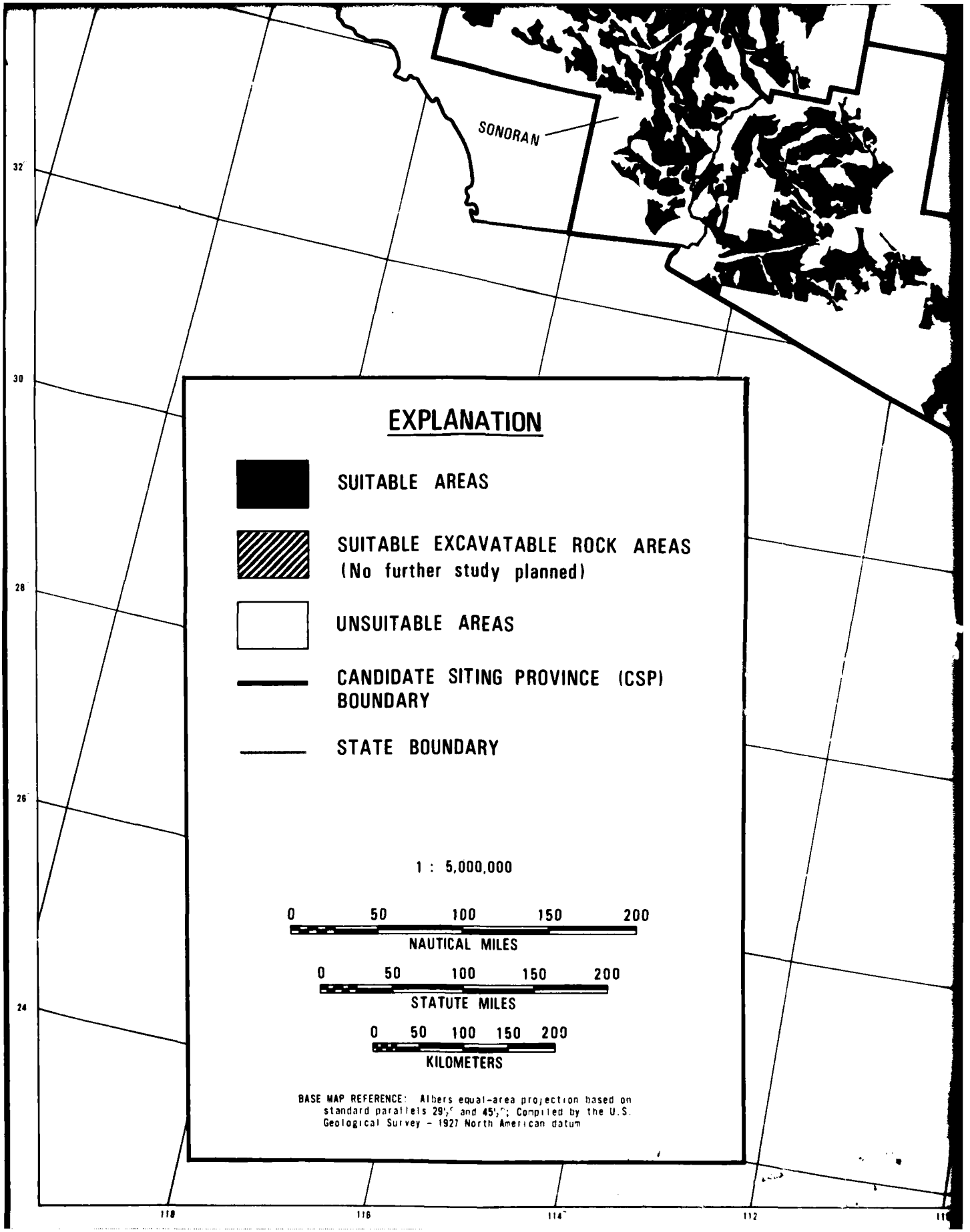
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DRAWING 2.2-A

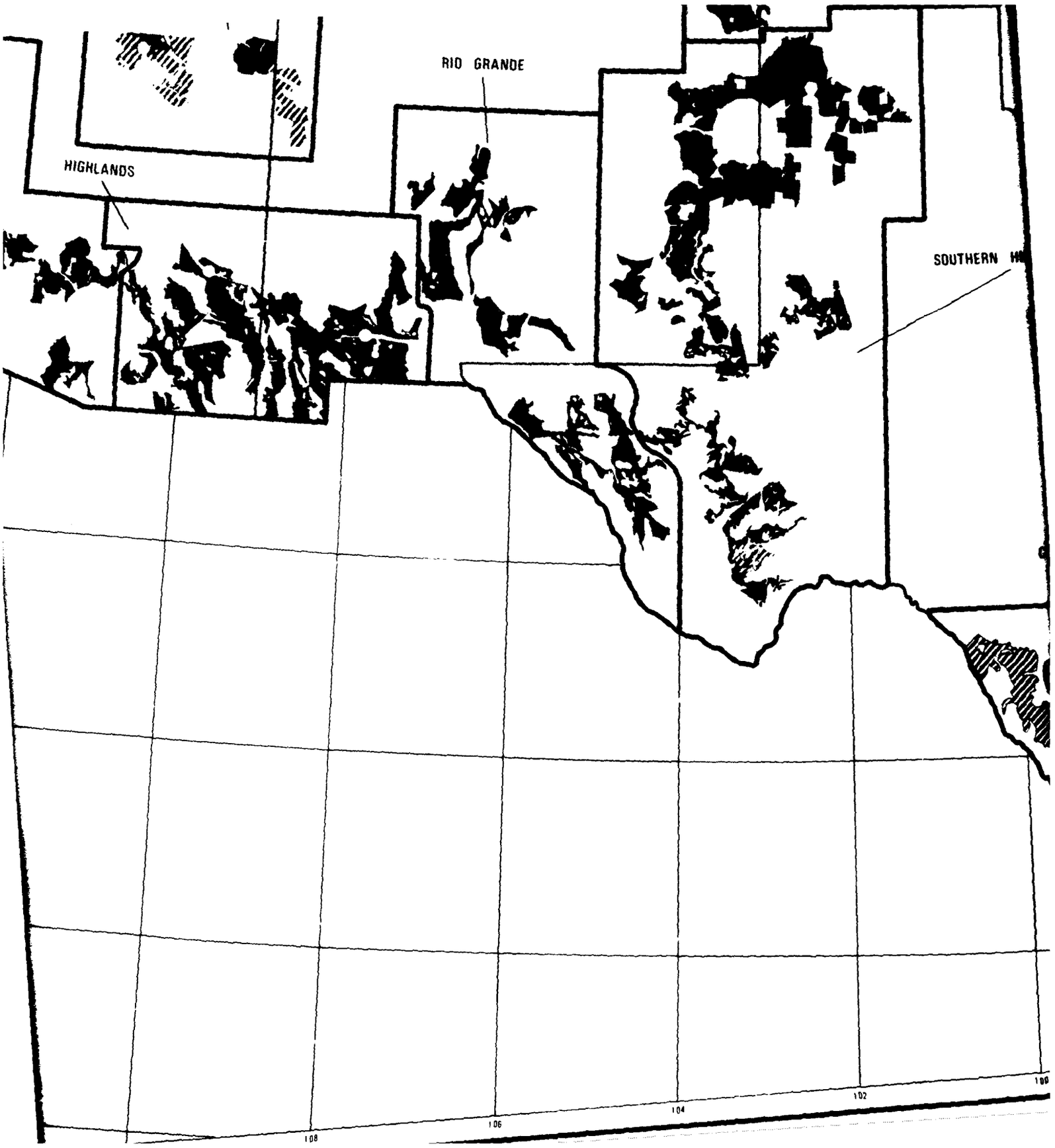


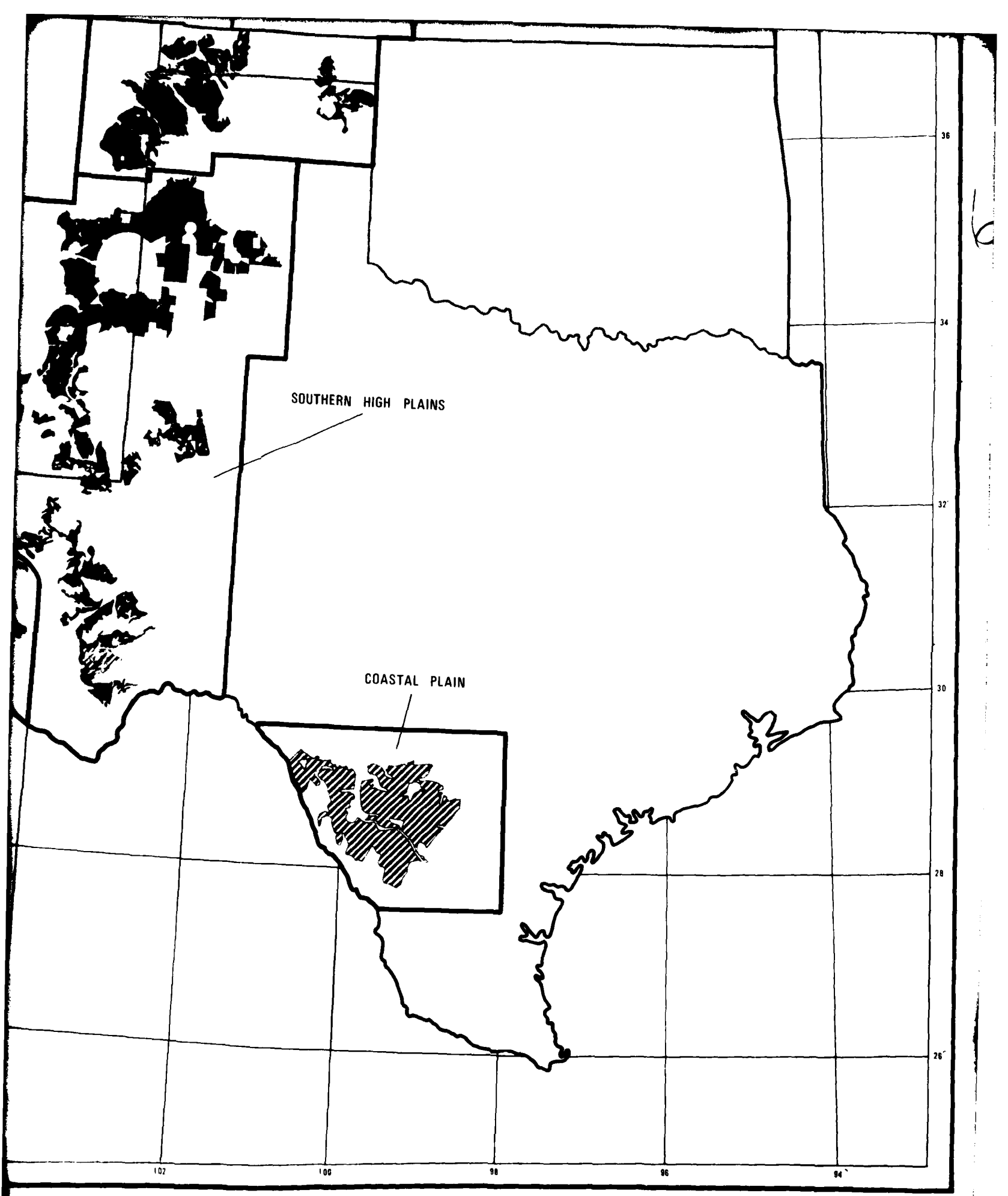

SONORAN
EXPLANATION
SUITABLE AREAS
SUITABLE EXCAVATABLE ROCK AREAS
(No further study planned)
UNSUITABLE AREAS
CANDIDATE SITING PROVINCE (CSP)
BOUNDARY
STATE BOUNDARY


PLATEAU
RIO GRANDE
HIGHLANDS
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CENTRAL HIGH PLAINS
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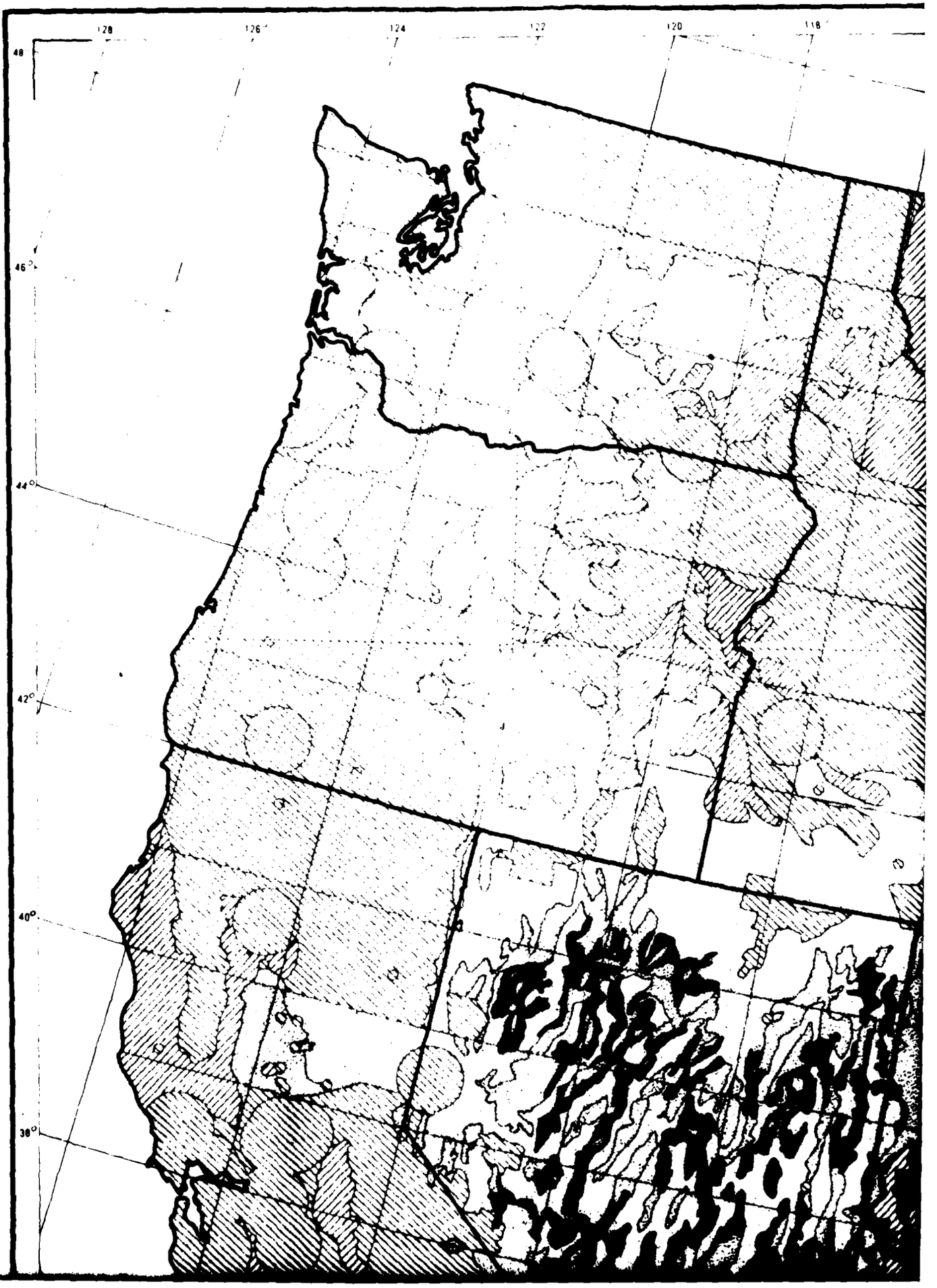

SONORAN
32
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EXPLANATION
SUITABLE AREAS
SUITABLE EXCAVATABLE ROCK AREAS
(No further study planned)
UNSUITABLE AREAS
CANDIDATE SITING PROVINCE (CSP) BOUNDARY
STATE BOUNDARY
1 : 5,000,000
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NAUTICAL MILES
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STATUTE MILES
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KILOMETERS
BASE MAP REFERENCE: Albers equal-area projection based on standard parallels 29½° and 45½°; Compiled by the U.S. Geological Survey - 1927 North American datum

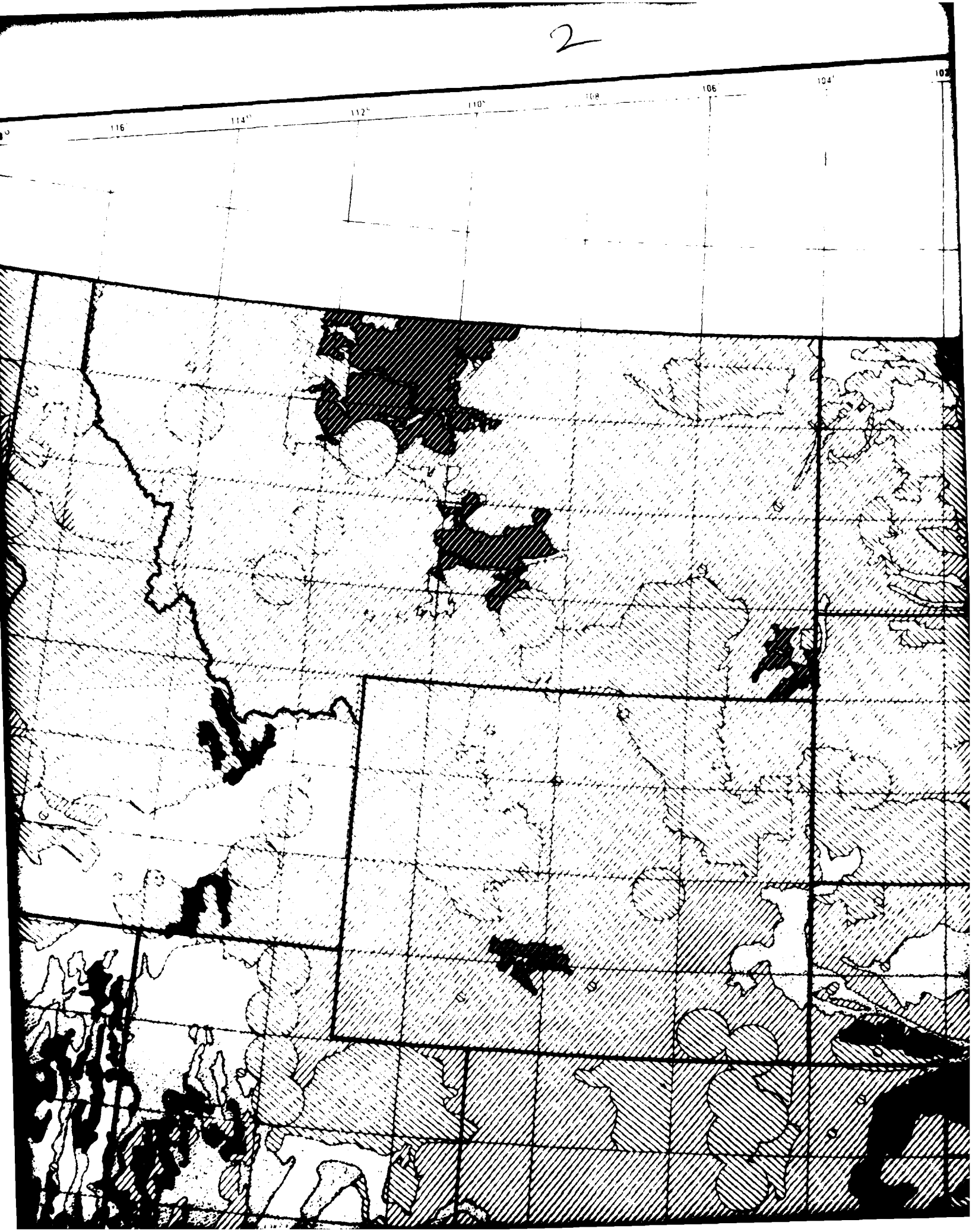

RIO GRANDE
HIGHLANDS
SOUTHERN H
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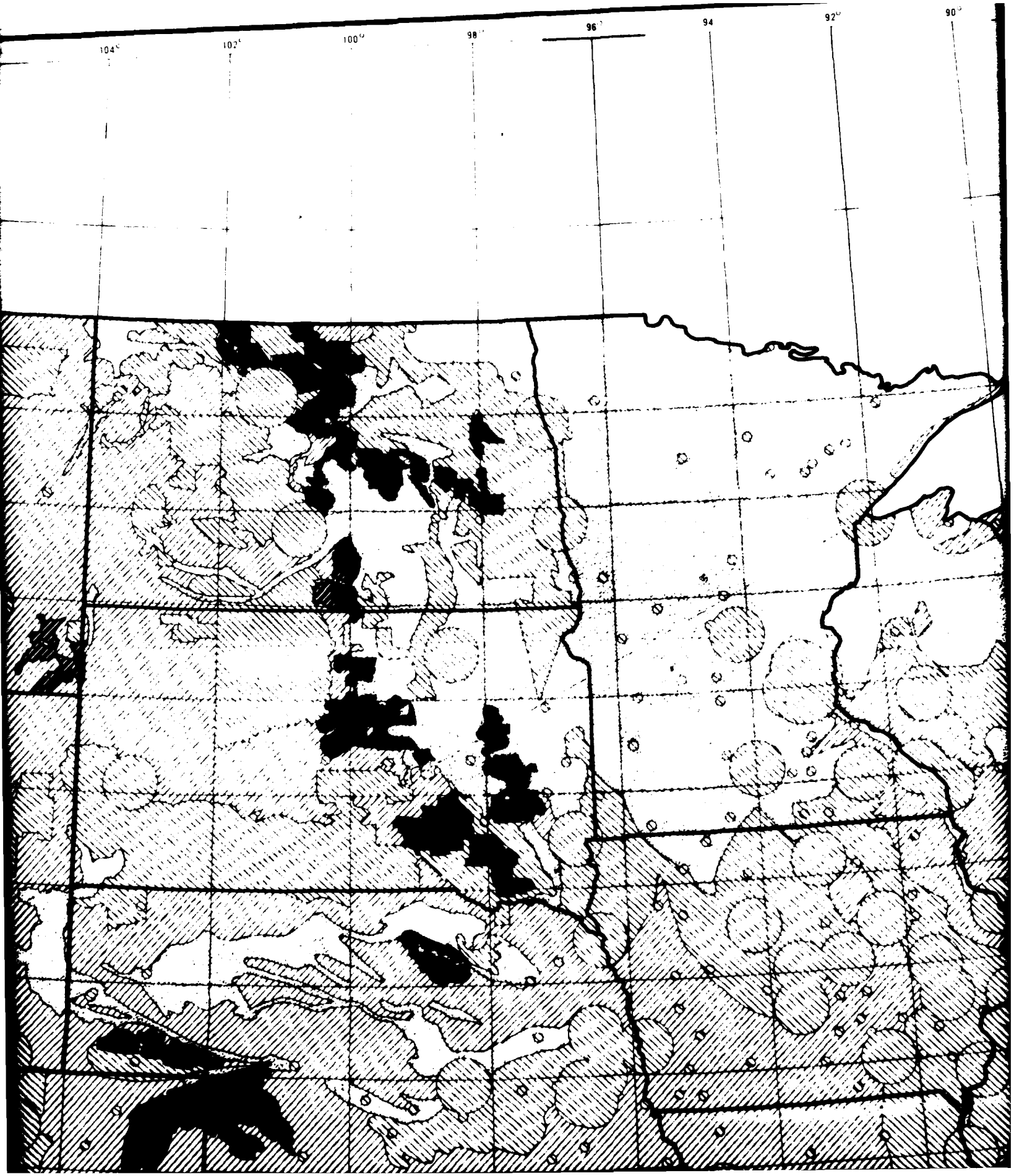


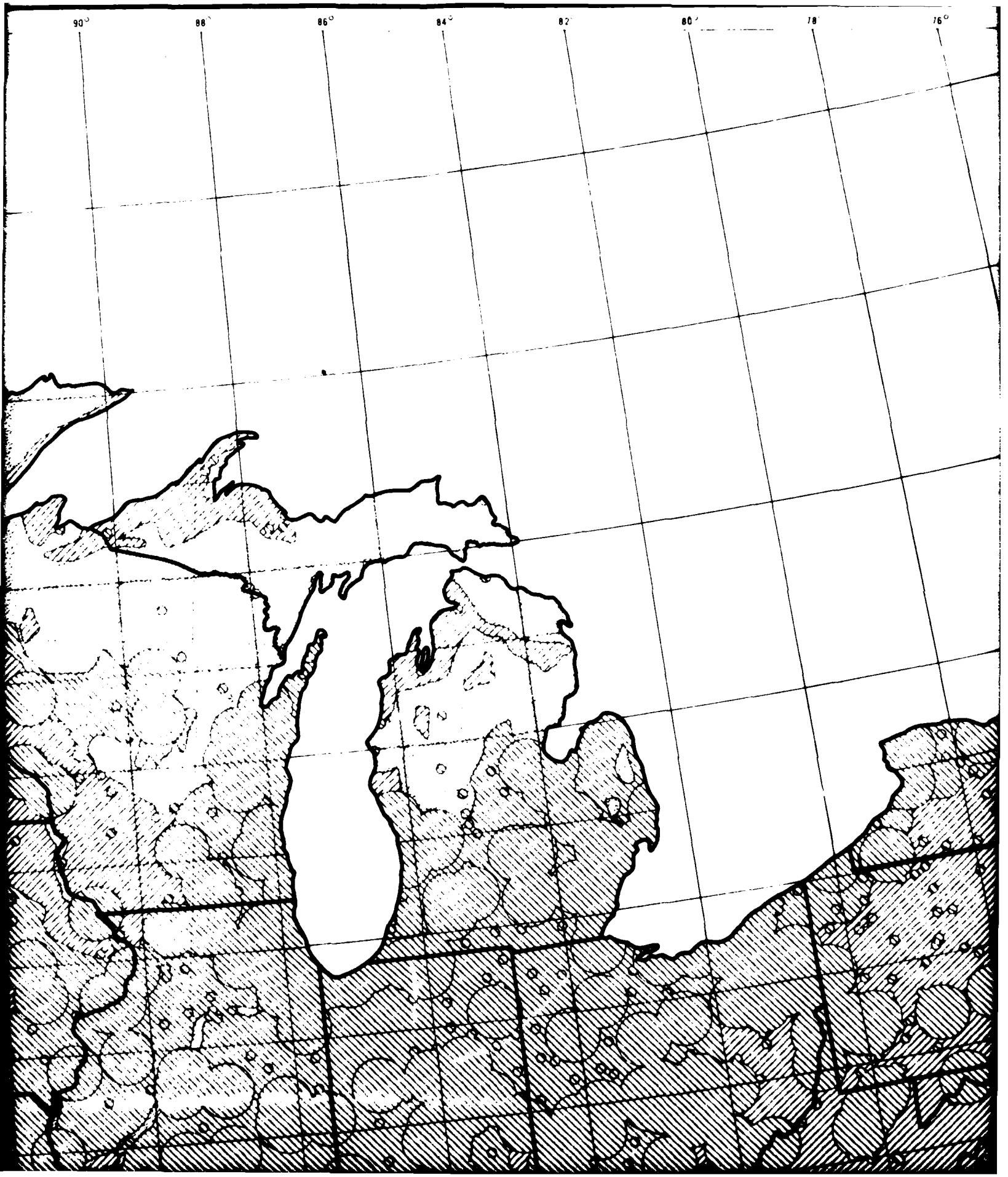
FUGRO NATIONAL, INC.

MX SITING INVESTIGATION
CONTERMINOUS UNITED STATES

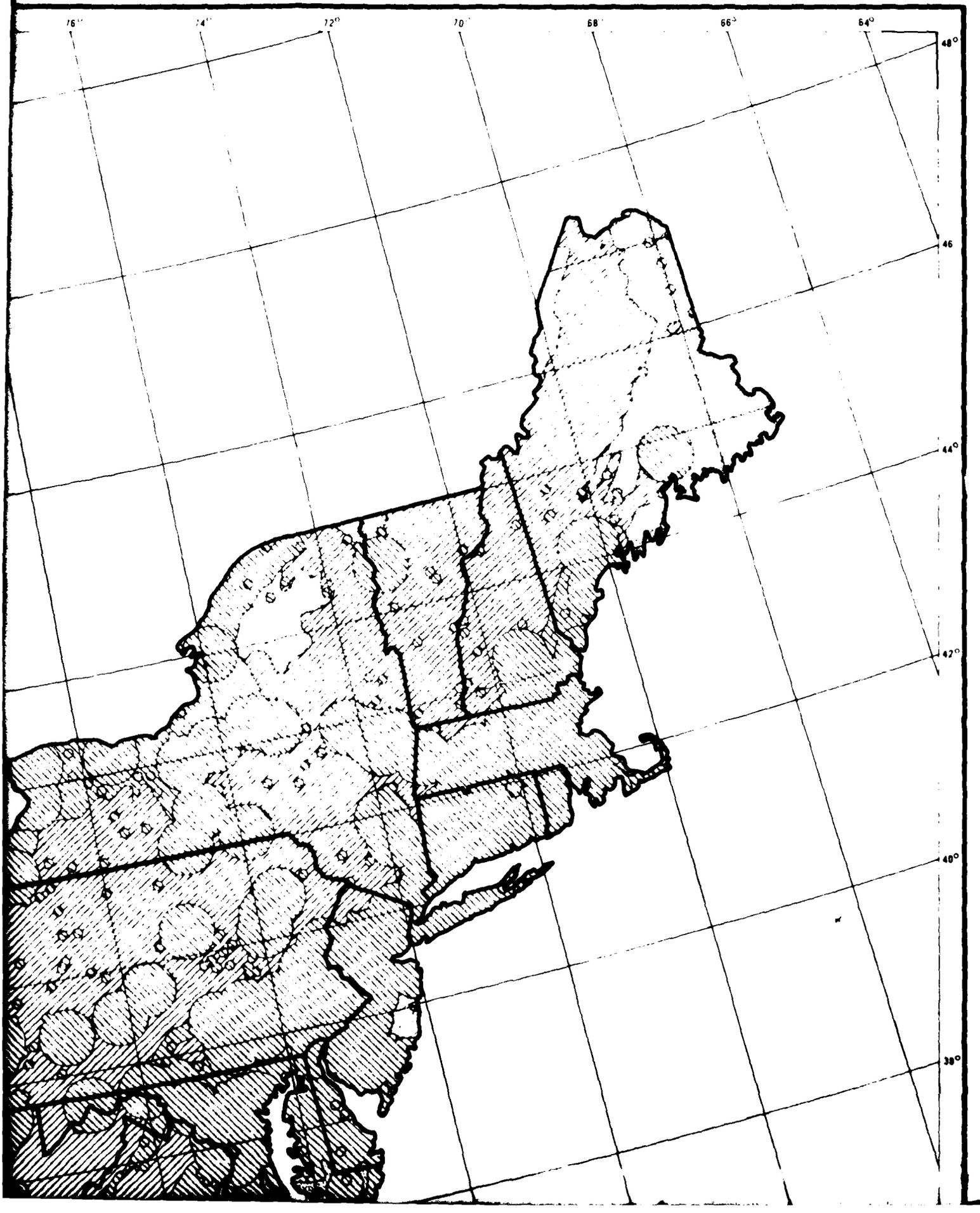



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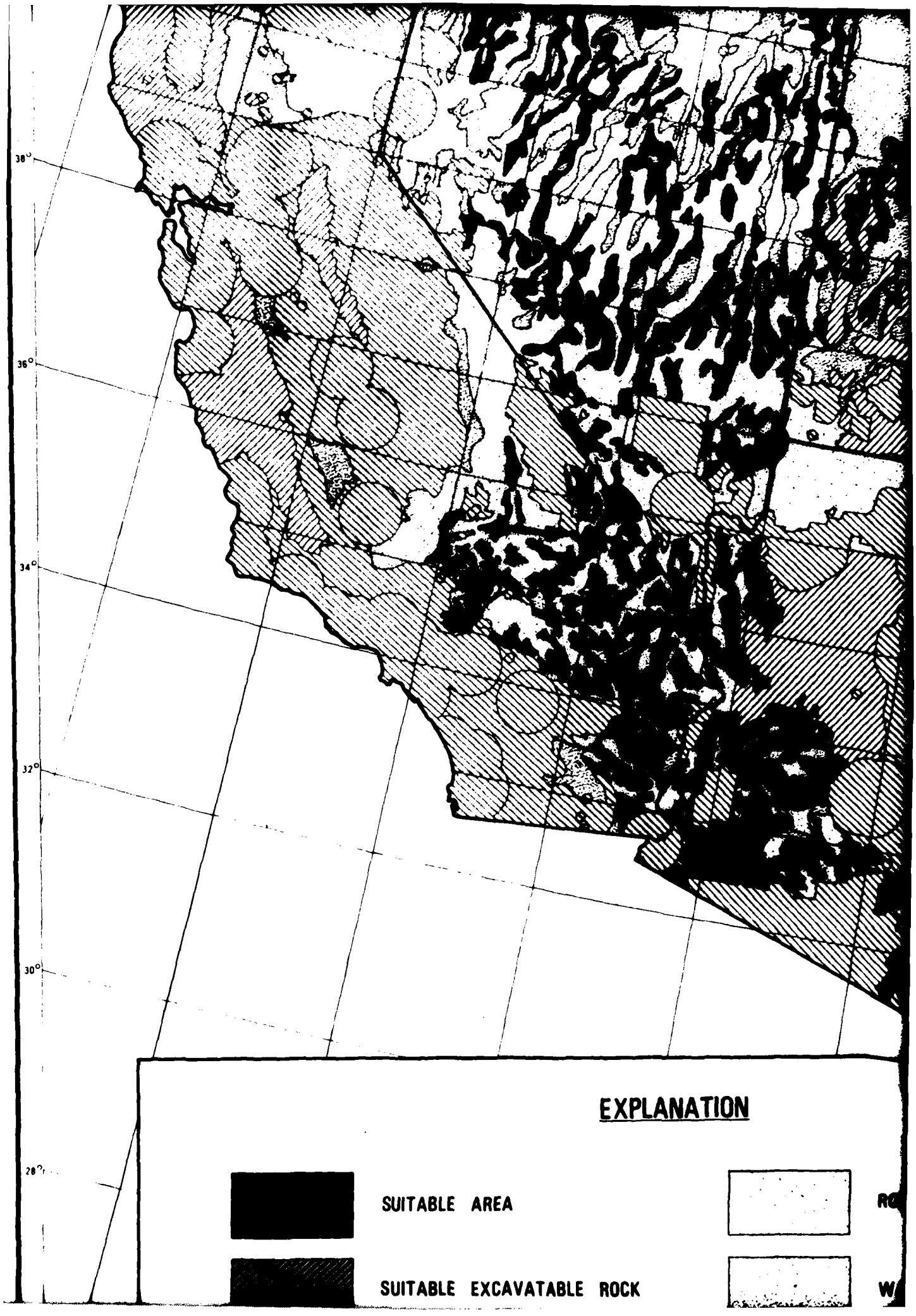

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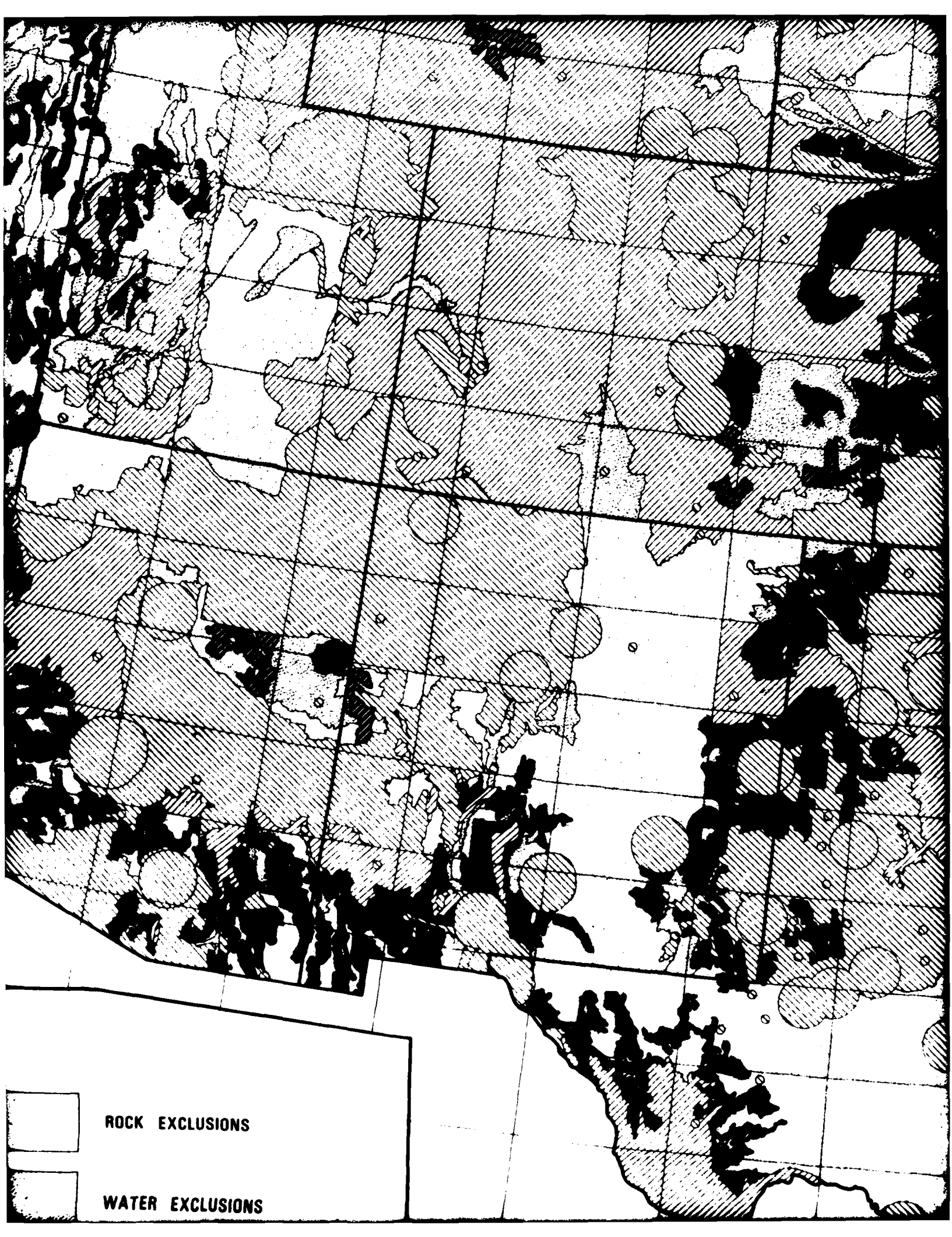

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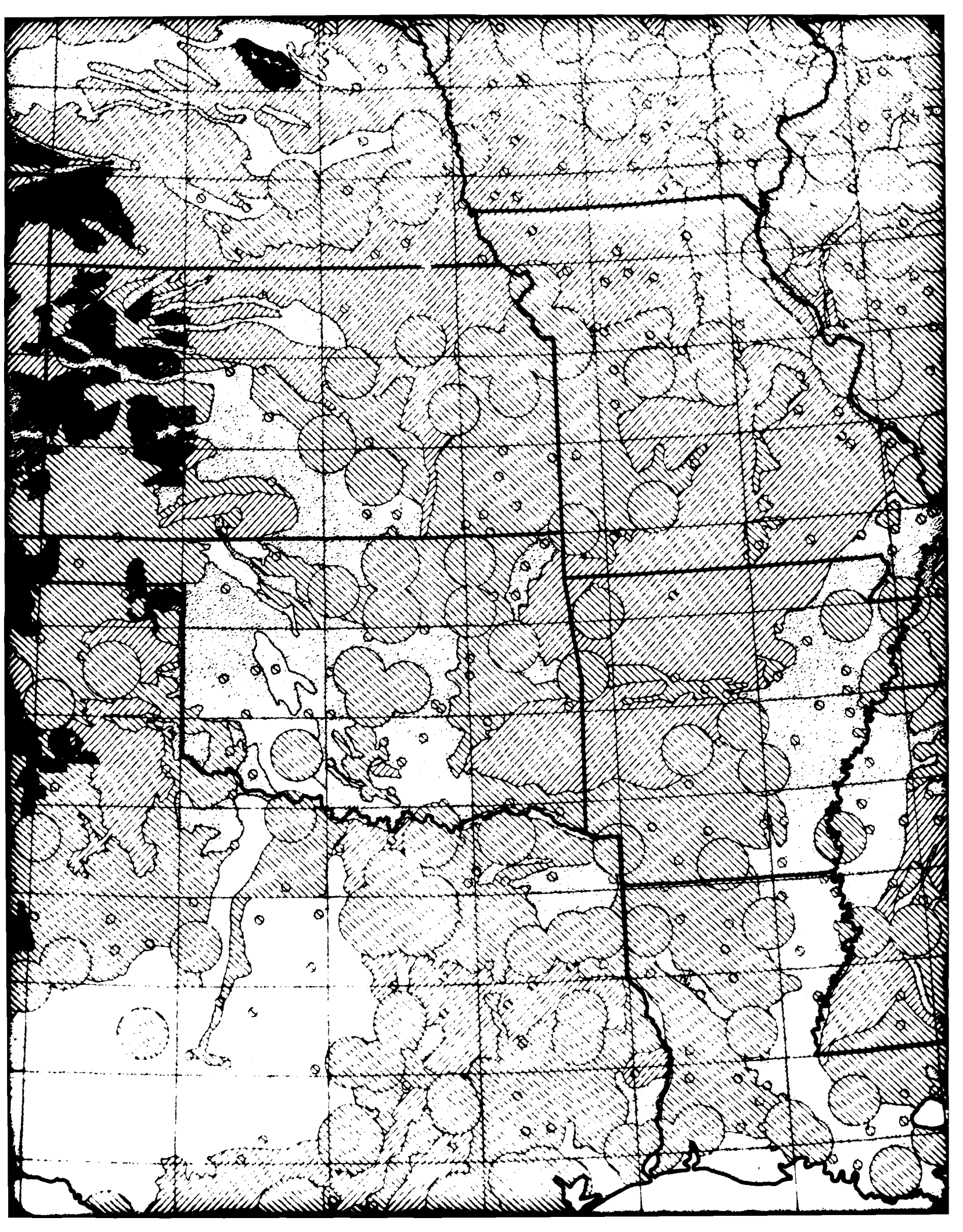
INTERMEDIATE SCREENING
DRAWING 2.2-B

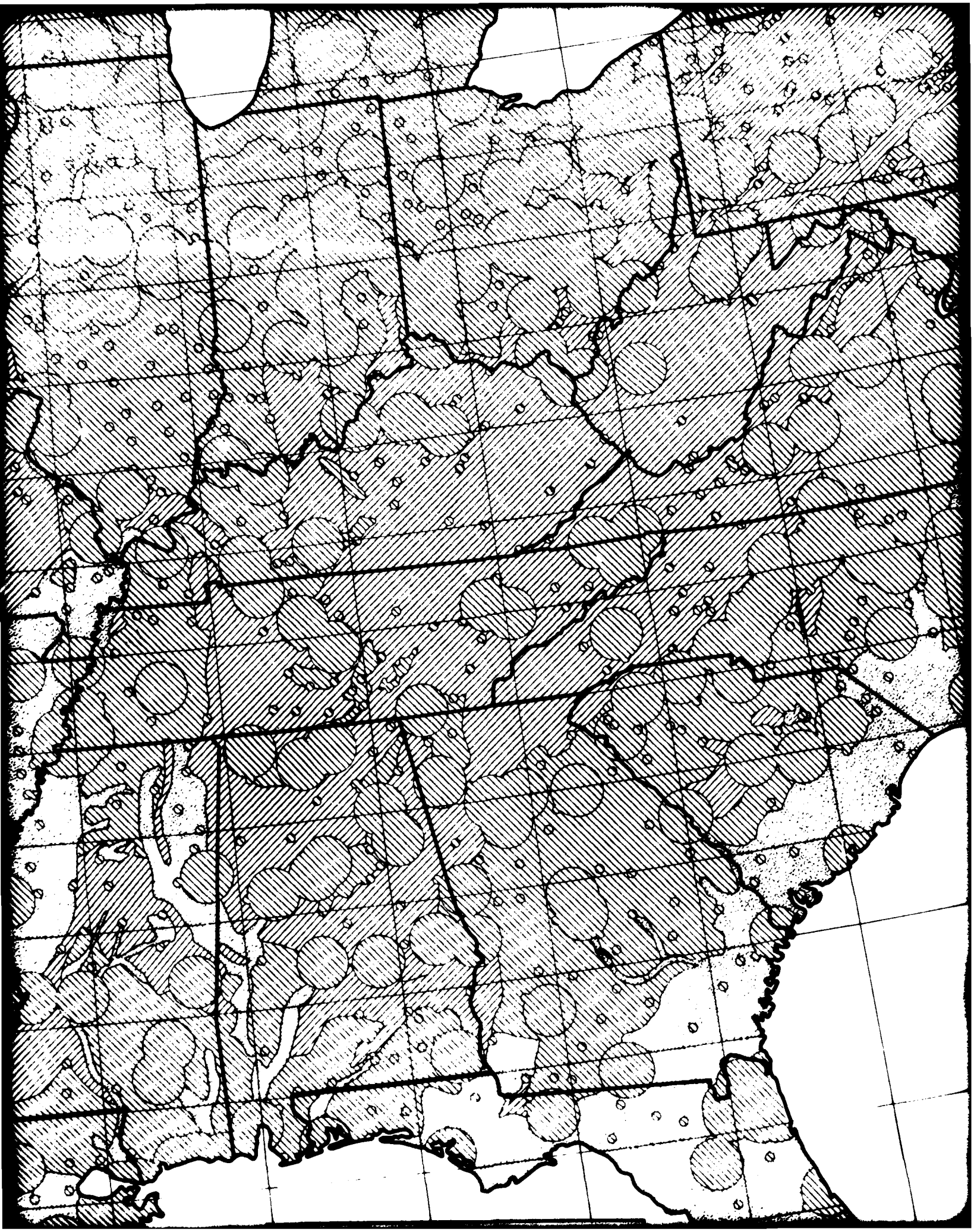


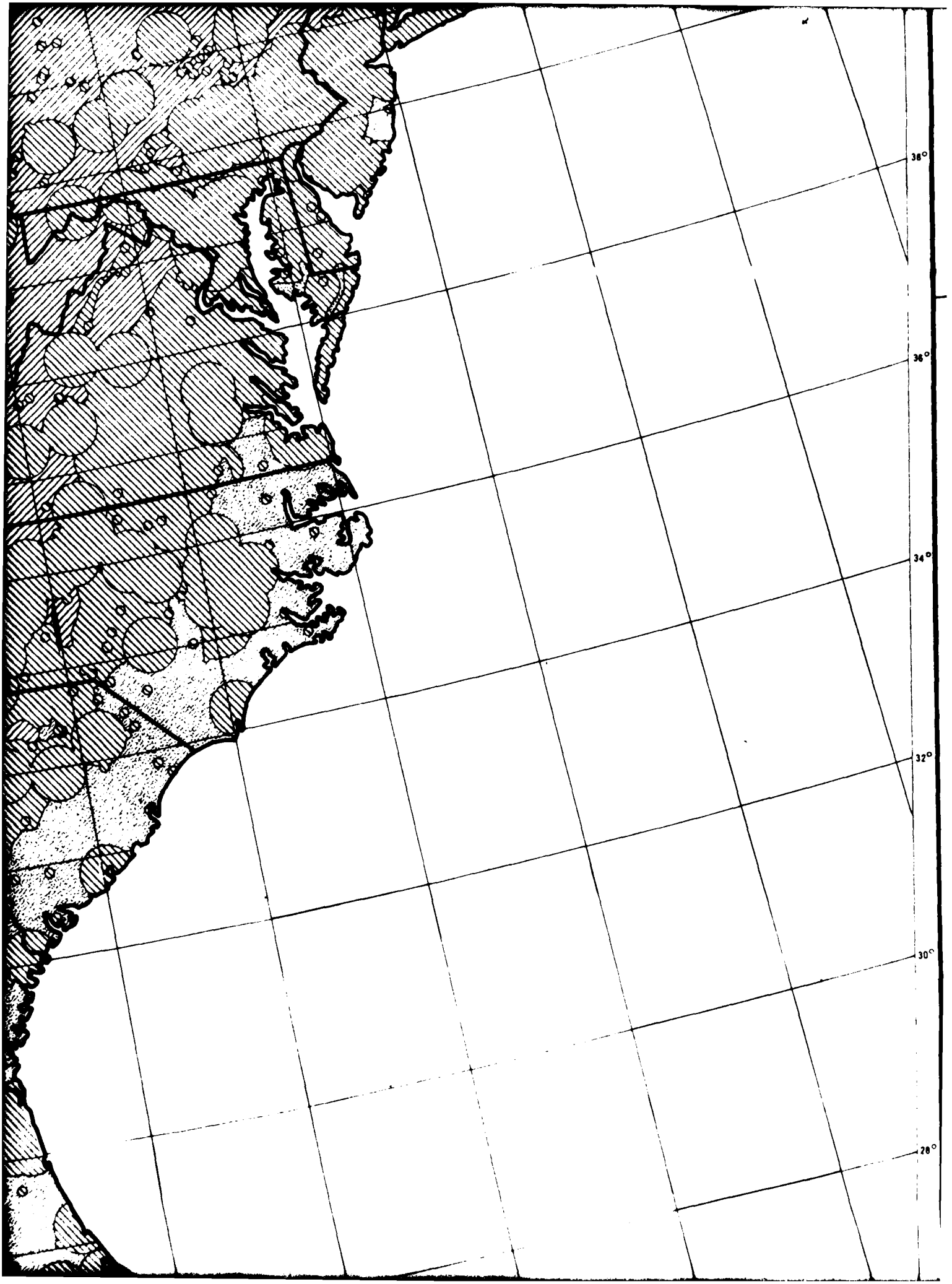
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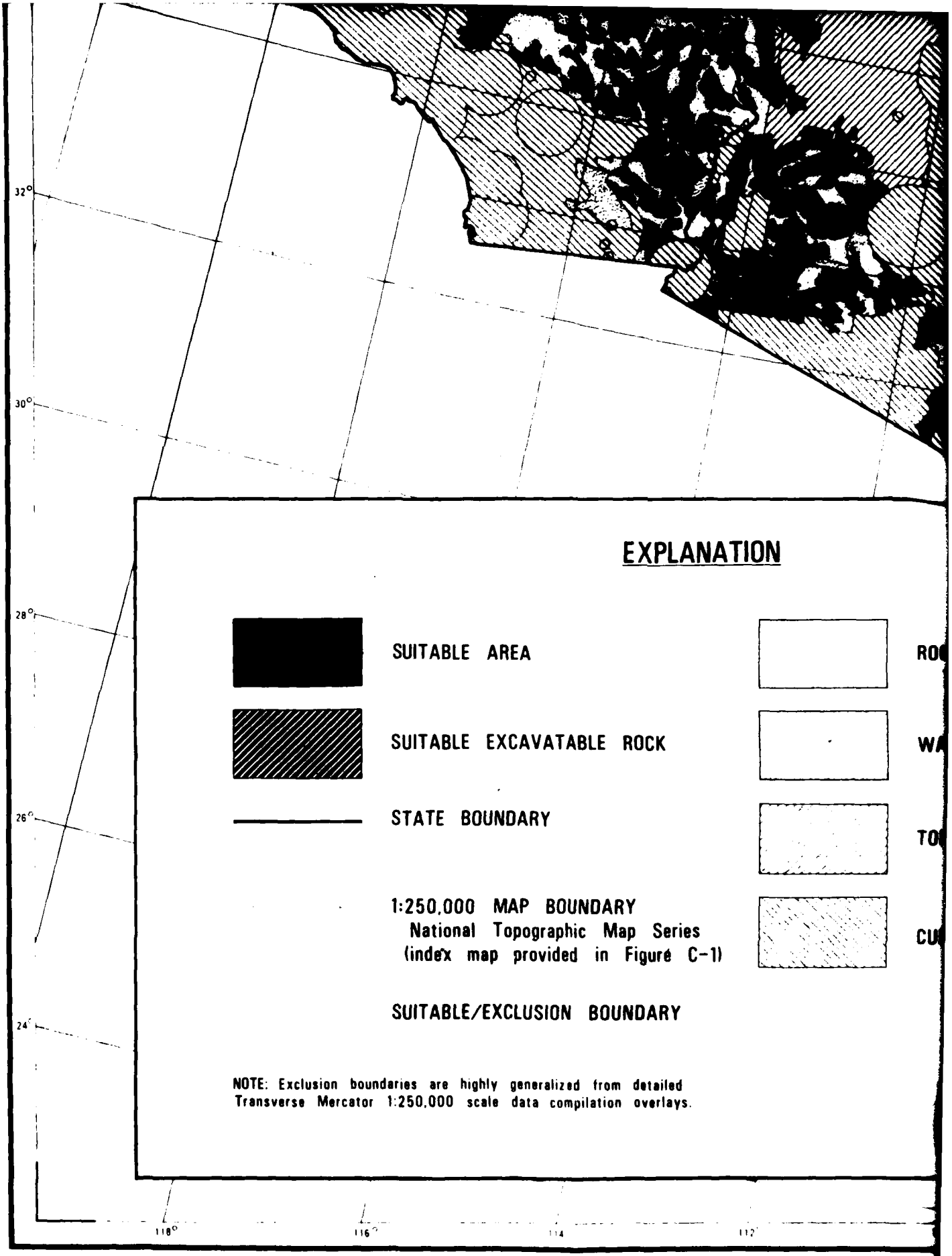

38°
36°
34°
32°
30°
28°
EXPLANATION
SUITABLE AREA
SUITABLE EXCAVATABLE ROCK

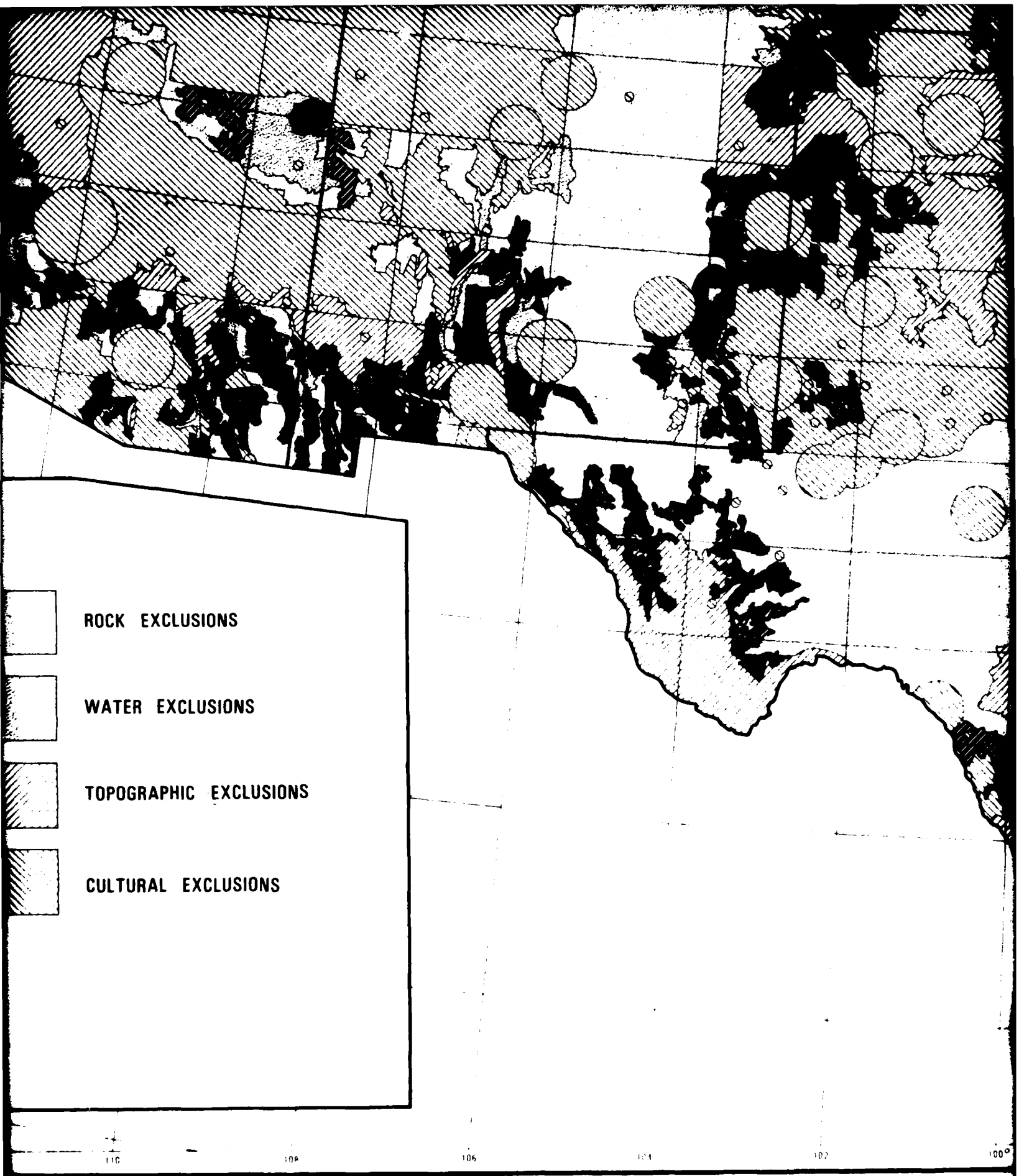

ROCK EXCLUSIONS
WATER EXCLUSIONS

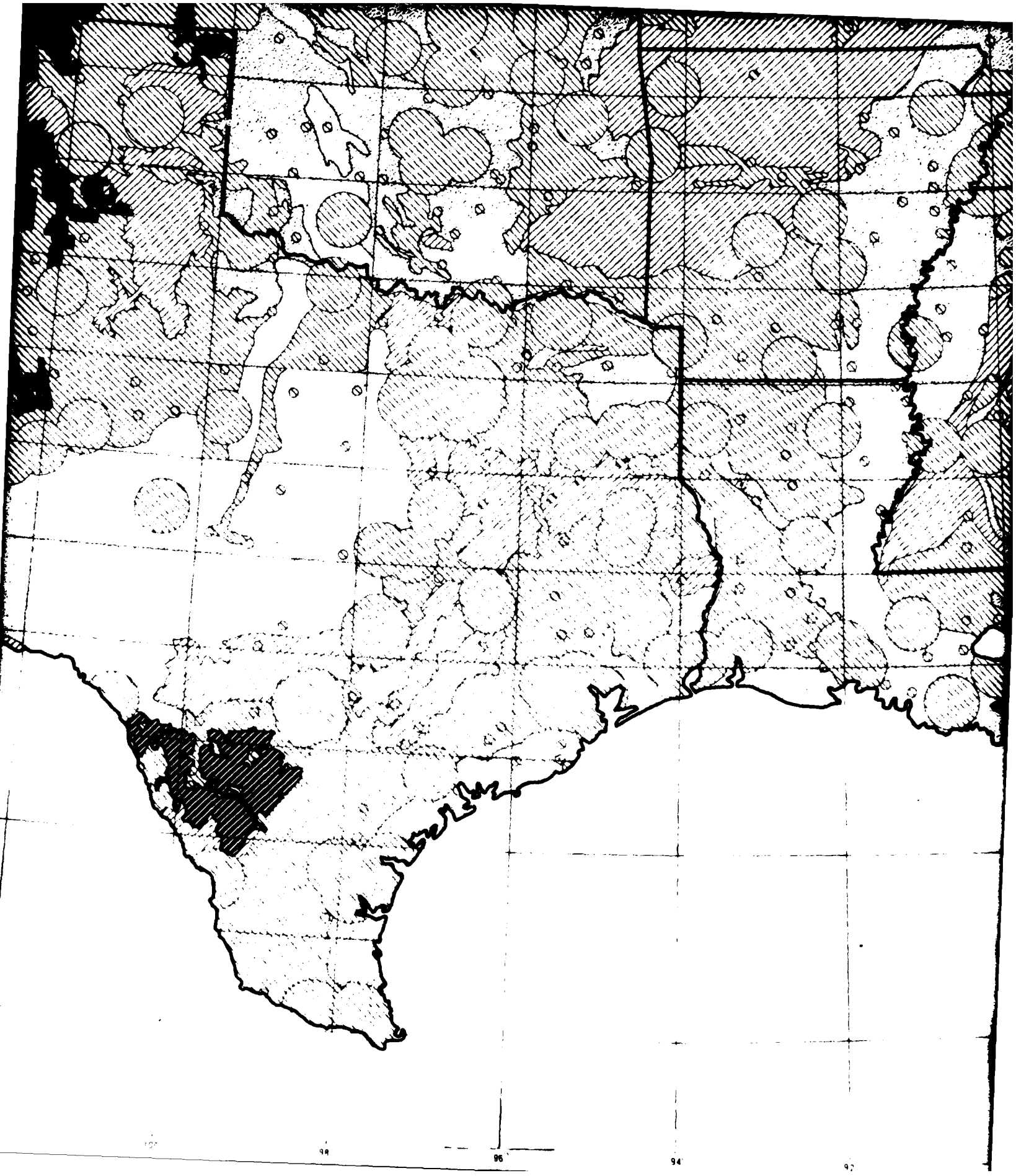


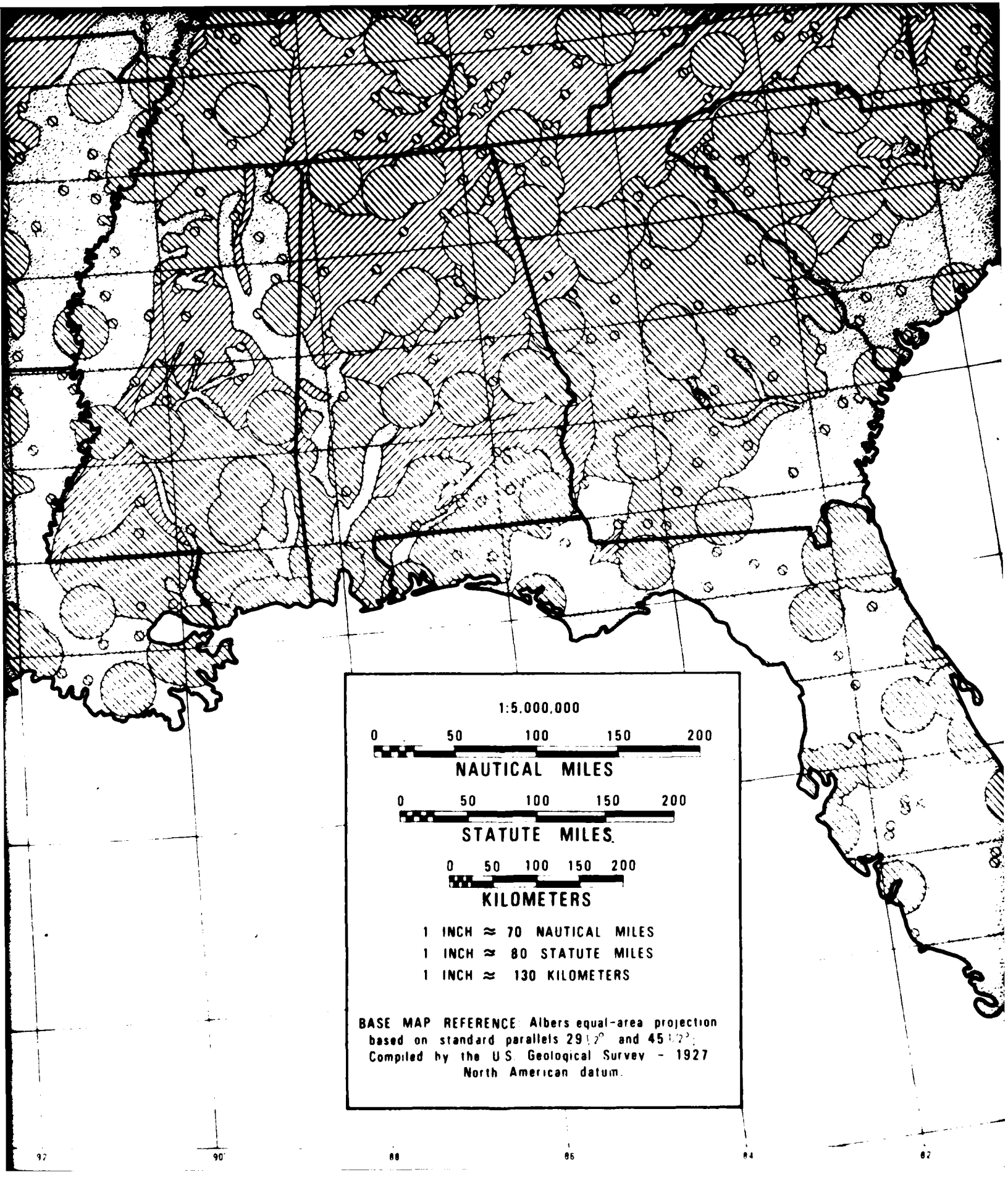


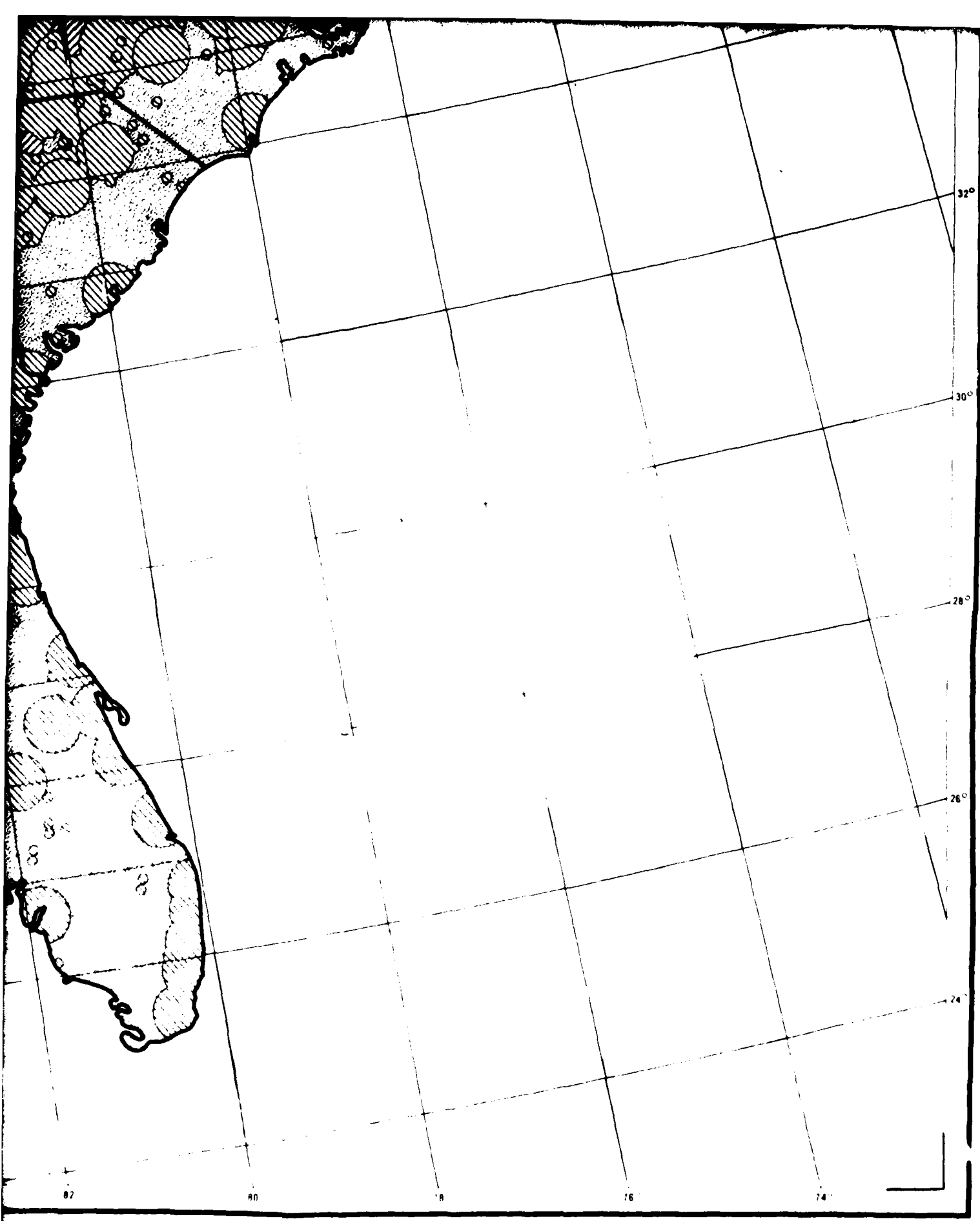

38°
36°
34°
32°
30°
28°


32°
30°
28°
26°
24°
118°
116°
114
112
EXPLANATION
SUITABLE AREA
SUITABLE EXCAVATABLE ROCK
STATE BOUNDARY
1:250,000 MAP BOUNDARY
National Topographic Map Series
(index map provided in Figure C-1)
SUITABLE/EXCLUSION BOUNDARY
NOTE: Exclusion boundaries are highly generalized from detailed Transverse Mercator 1:250,000 scale data compilation overlays.


ROCK EXCLUSIONS
WATER EXCLUSIONS
TOPOGRAPHIC EXCLUSIONS
CULTURAL EXCLUSIONS
110
108
106
104
102
100°


98
96
94
92

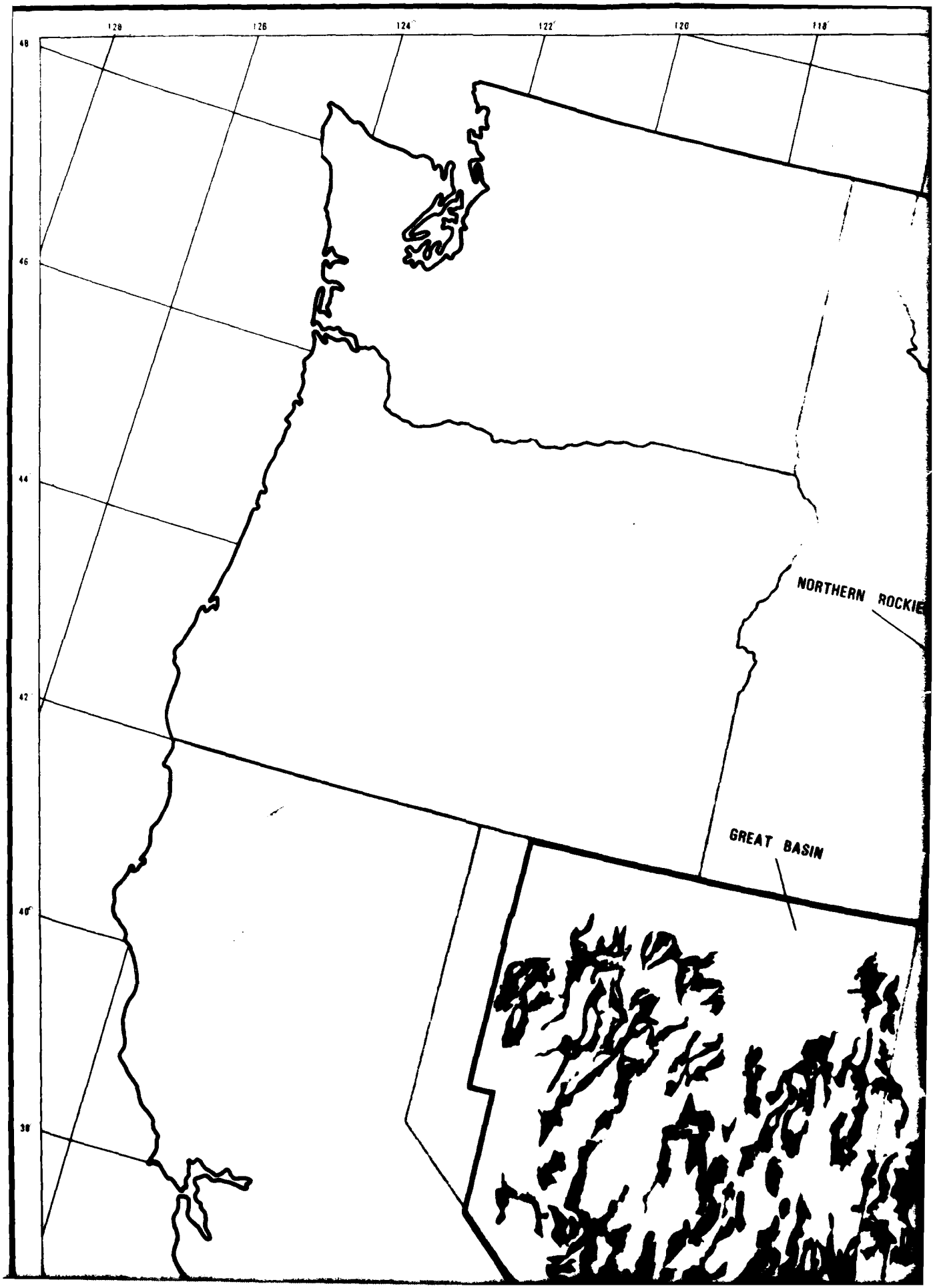

1:5,000,000
0 50 100 150 200
NAUTICAL MILES
0 50 100 150 200
STATUTE MILES
0 50 100 150 200
KILOMETERS
1 INCH ≈ 70 NAUTICAL MILES
1 INCH ≈ 80 STATUTE MILES
1 INCH ≈ 130 KILOMETERS
BASE MAP REFERENCE: Albers equal-area projection based on standard parallels 29 1/2° and 45 1/2°. Compiled by the U.S. Geological Survey - 1927 North American datum.
92
90
88
86
84
82

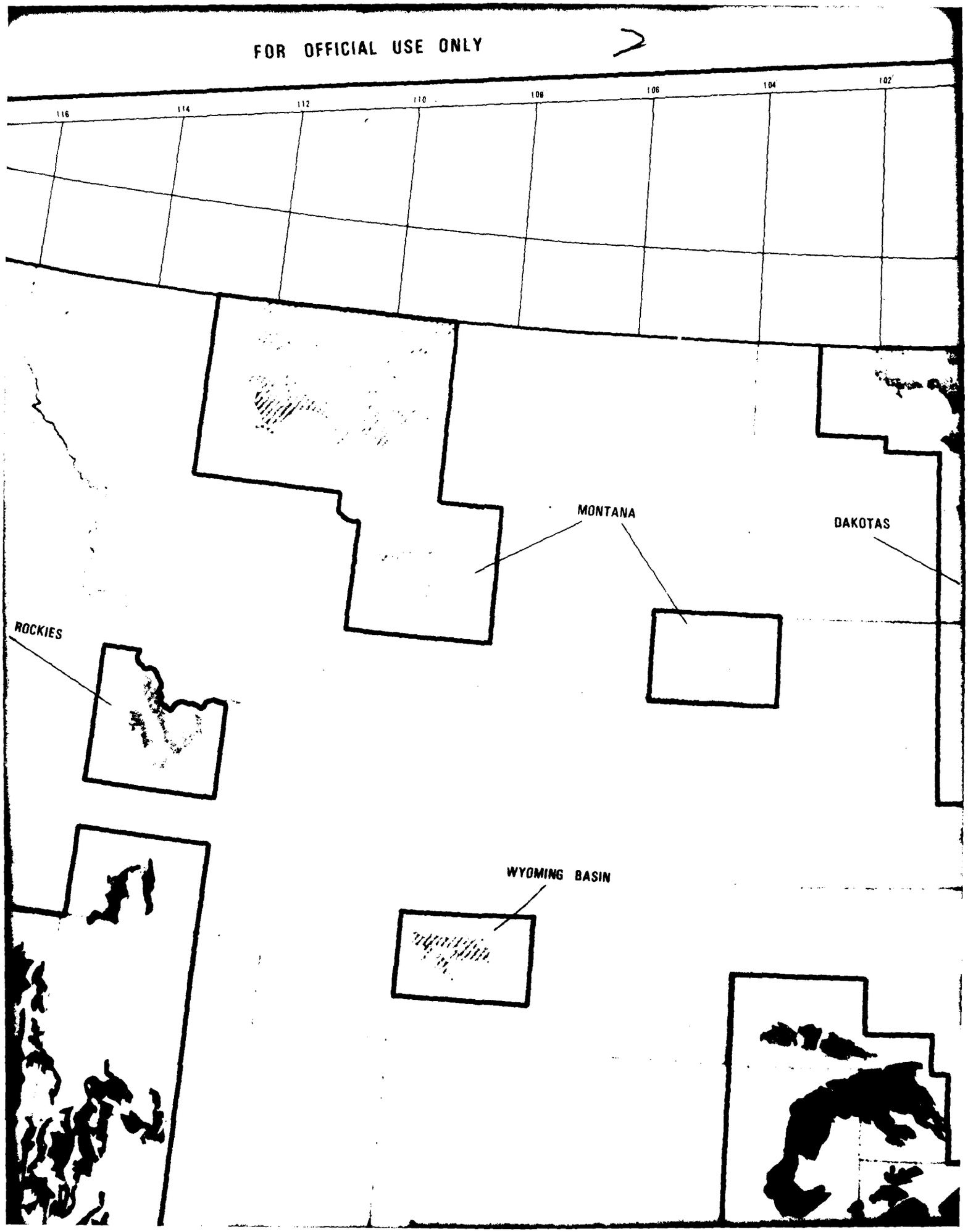


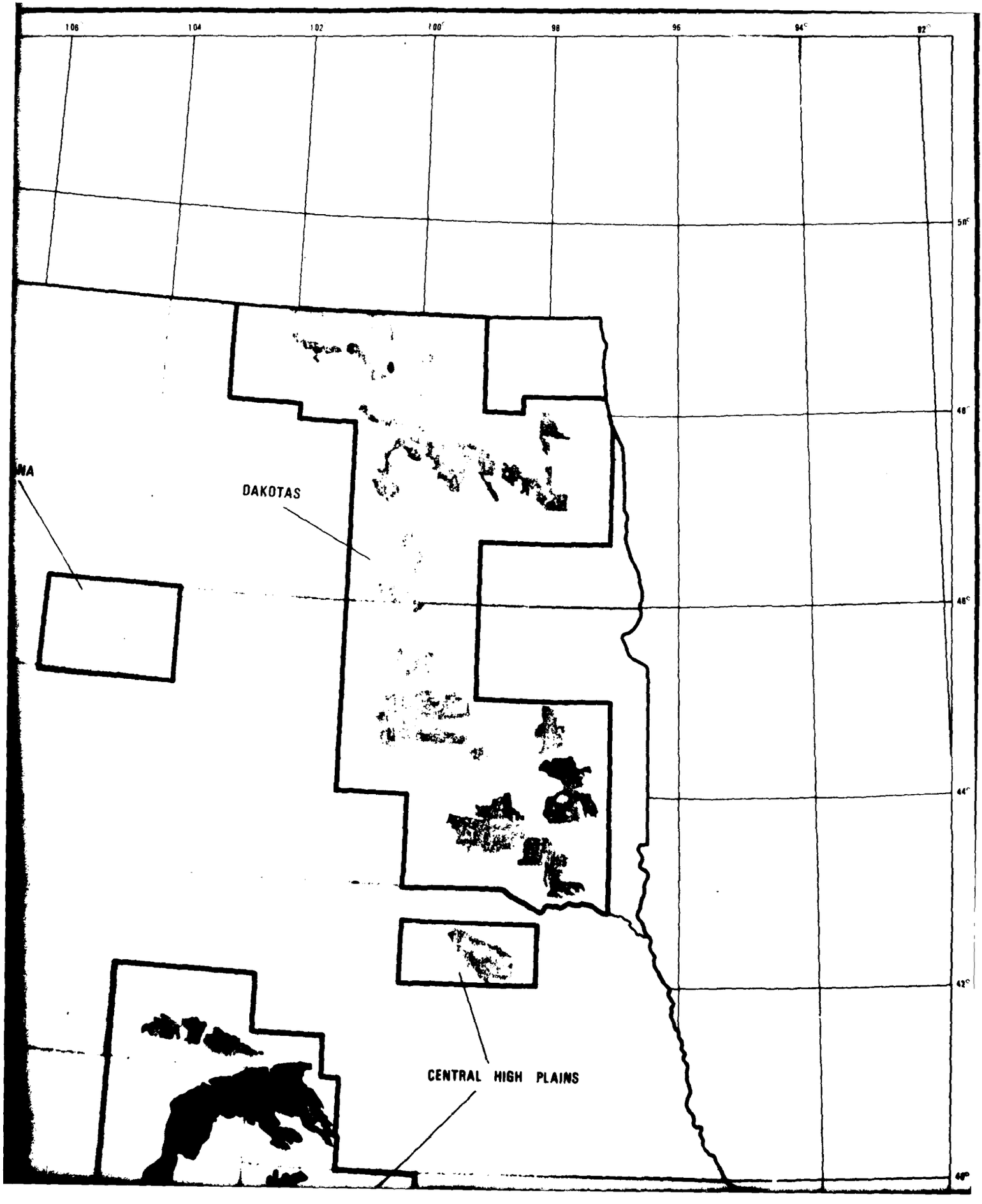
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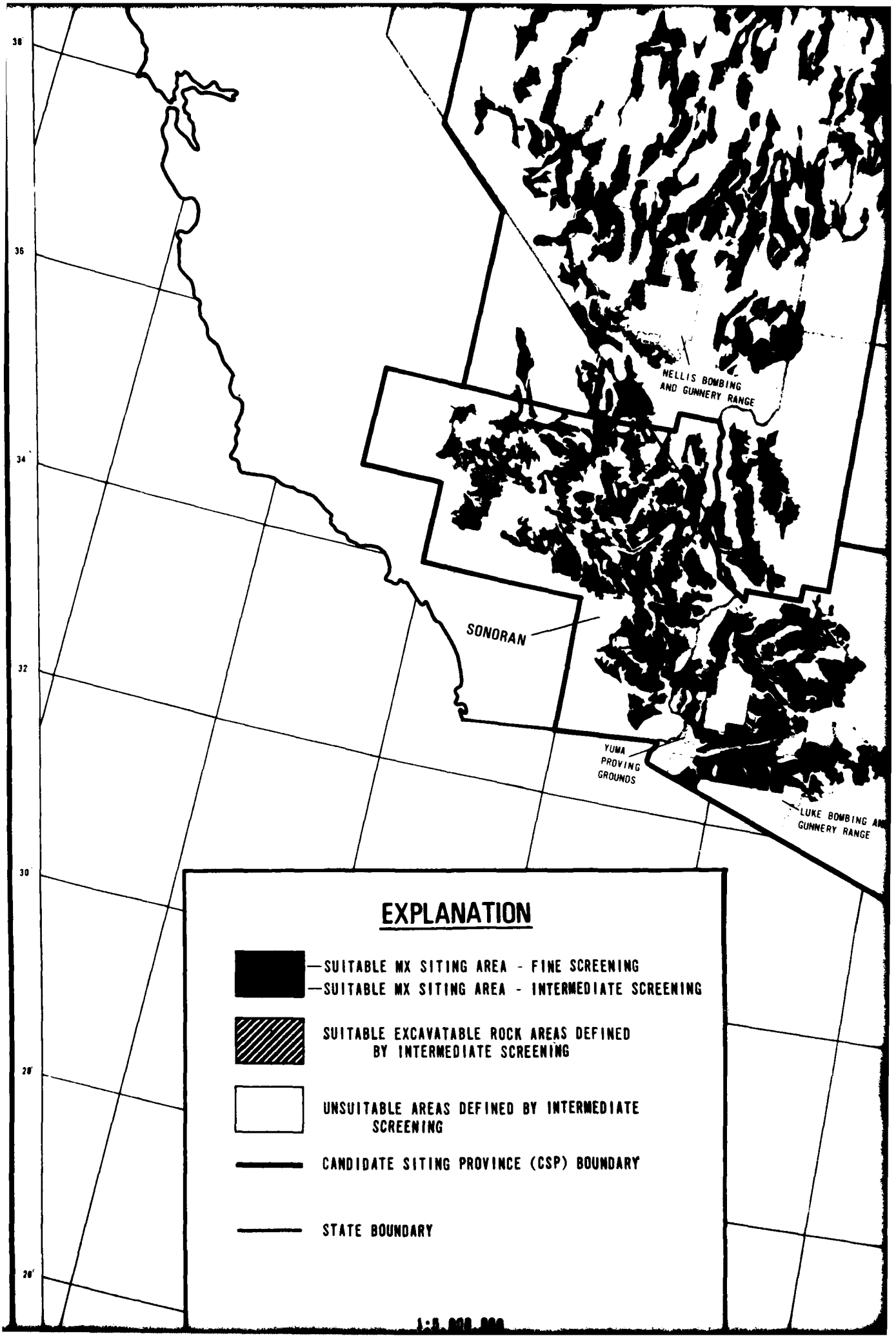
FUGRO NATIONAL, INC.

15

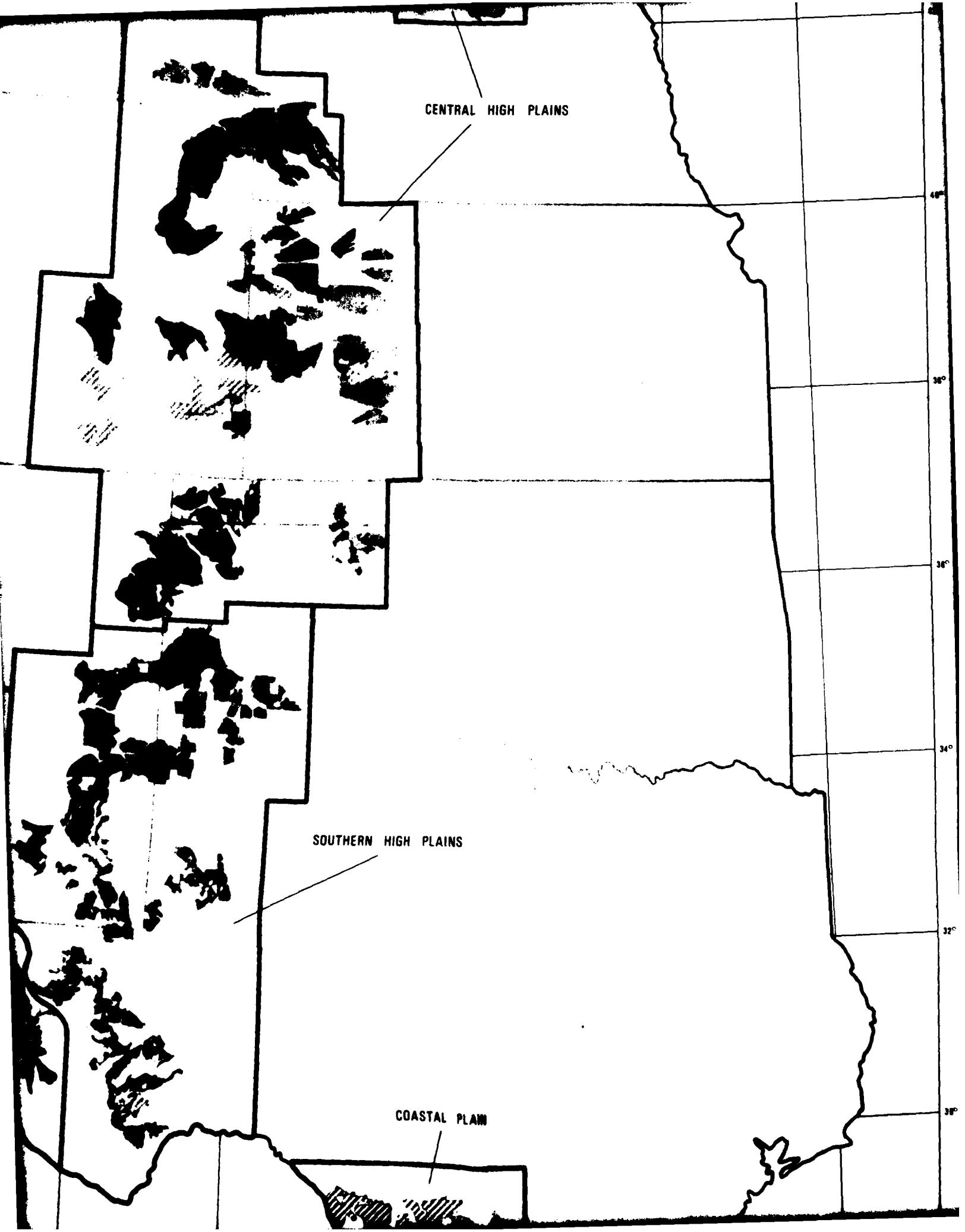

128
126
124
122
120
118
48
46
44
42
40
38
NORTHERN ROCKIE
GREAT BASIN

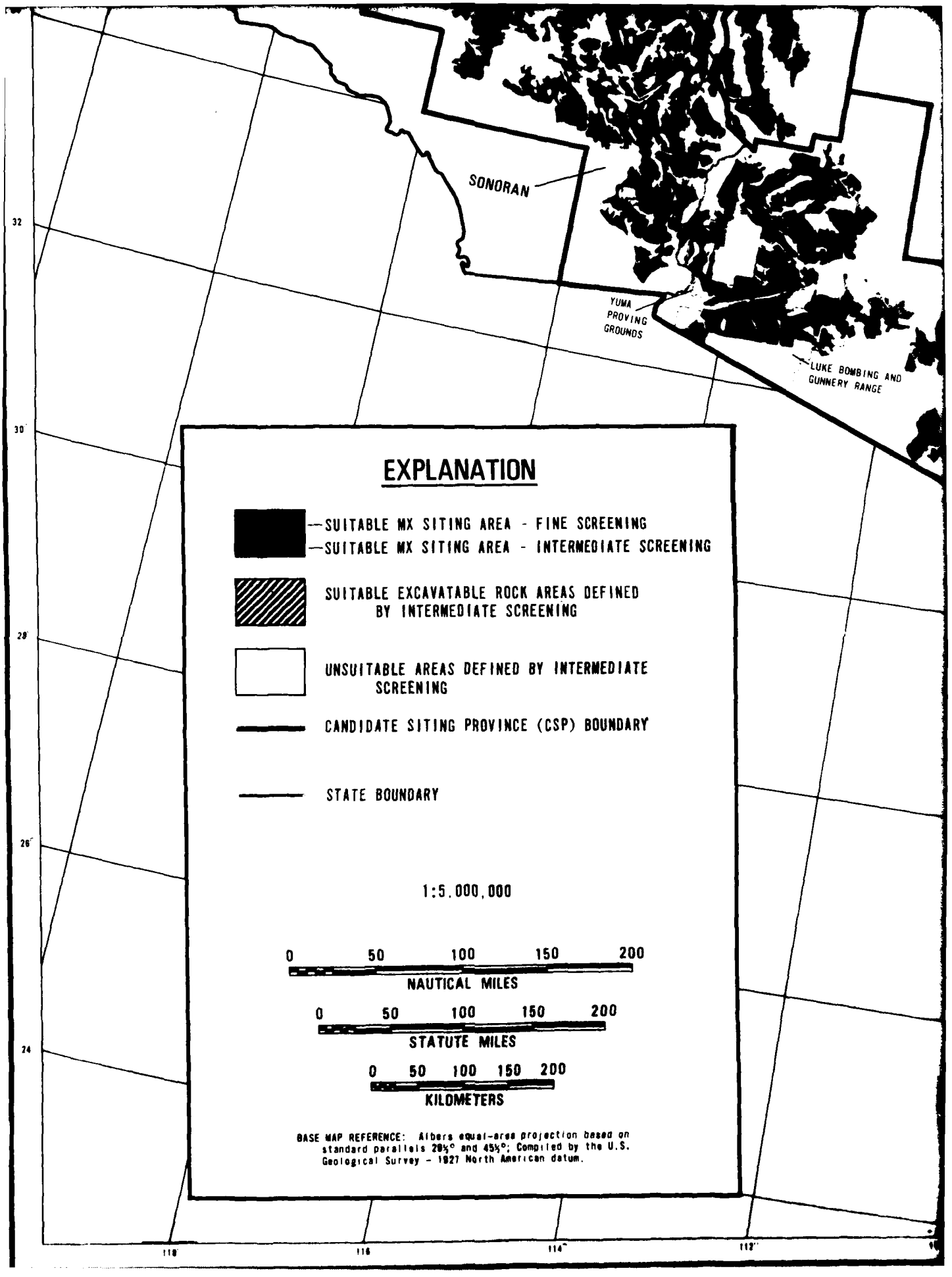

116
114
112
110
108
106
104
102
MONTANA
DAKOTAS
ROCKIES
WYOMING BASIN

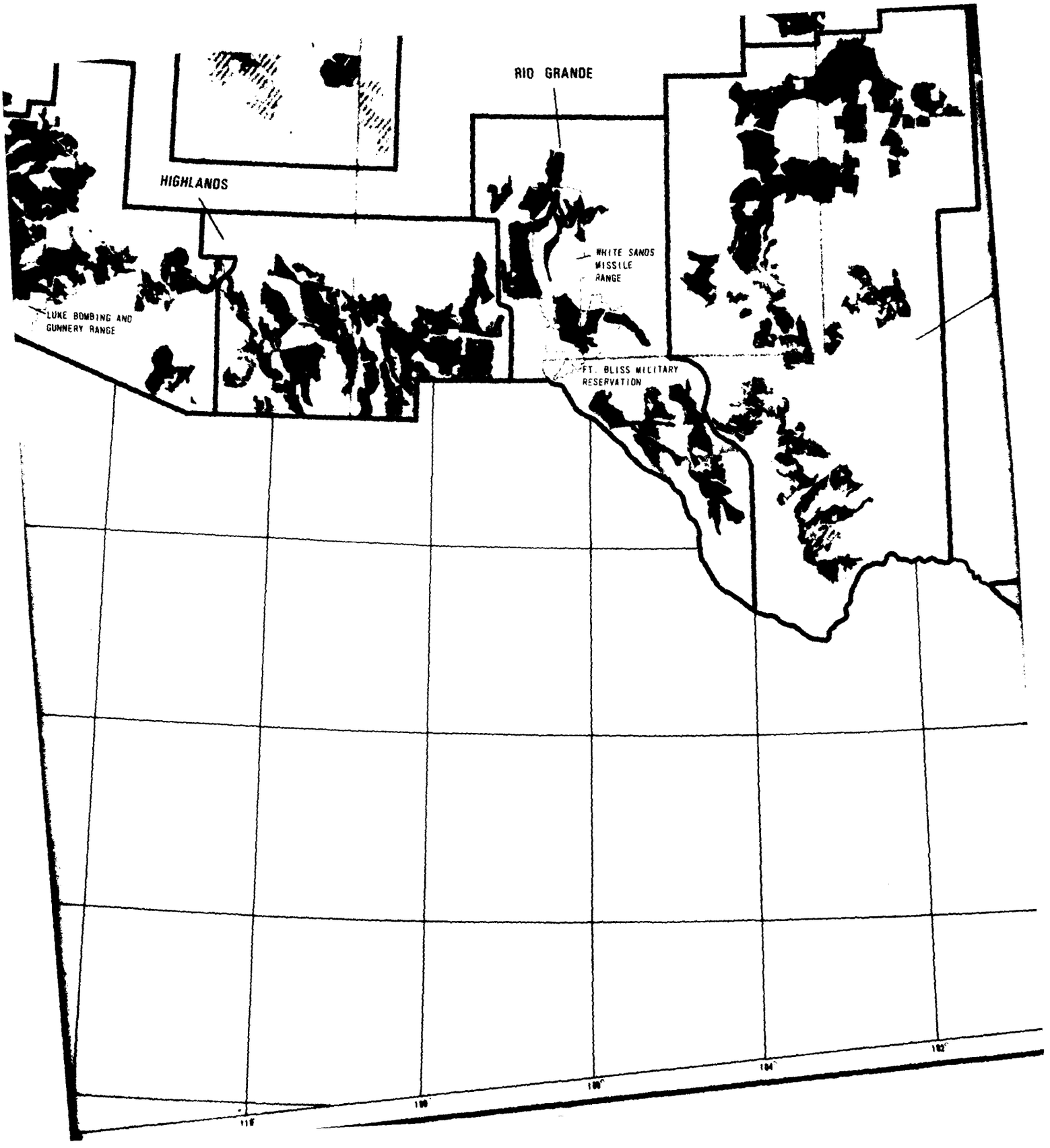

106
104
102
100
98
96
94°
92°
50°
48°
46°
44°
42°
40°
NA
DAKOTAS
CENTRAL HIGH PLAINS

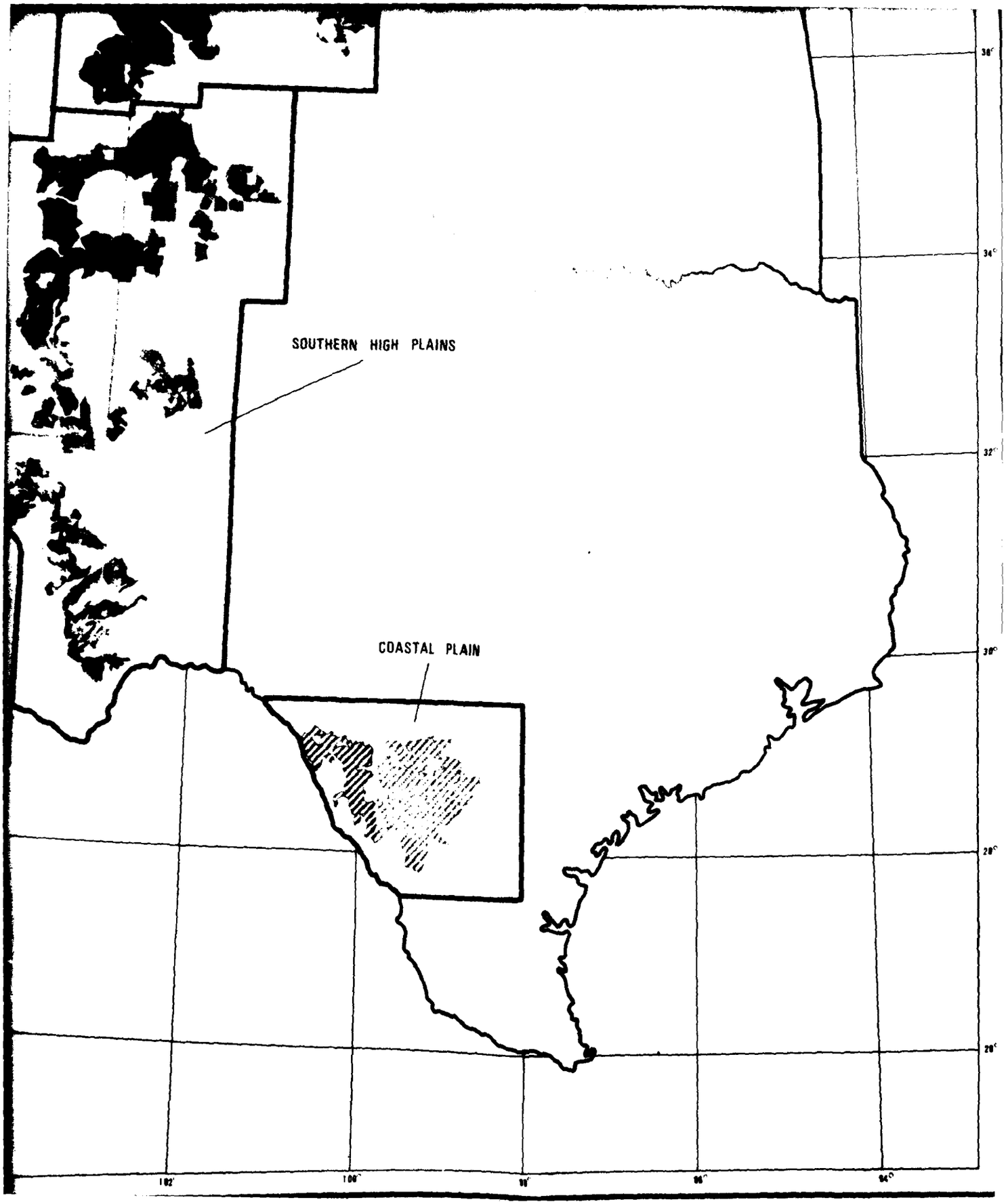

38
36
34
32
30
28
26
NELLIS BOMBING AND GUNNERY RANGE
SONORAN
YUMA PROVING GROUNDS
LUKE BOMBING AND GUNNERY RANGE
EXPLANATION
SUITABLE MX SITING AREA - FINE SCREENING
SUITABLE MX SITING AREA - INTERMEDIATE SCREENING
SUITABLE EXCAVATABLE ROCK AREAS DEFINED BY INTERMEDIATE SCREENING
UNSUITABLE AREAS DEFINED BY INTERMEDIATE SCREENING
CANDIDATE SITING PROVINCE (CSP) BOUNDARY
STATE BOUNDARY
1:3,000,000

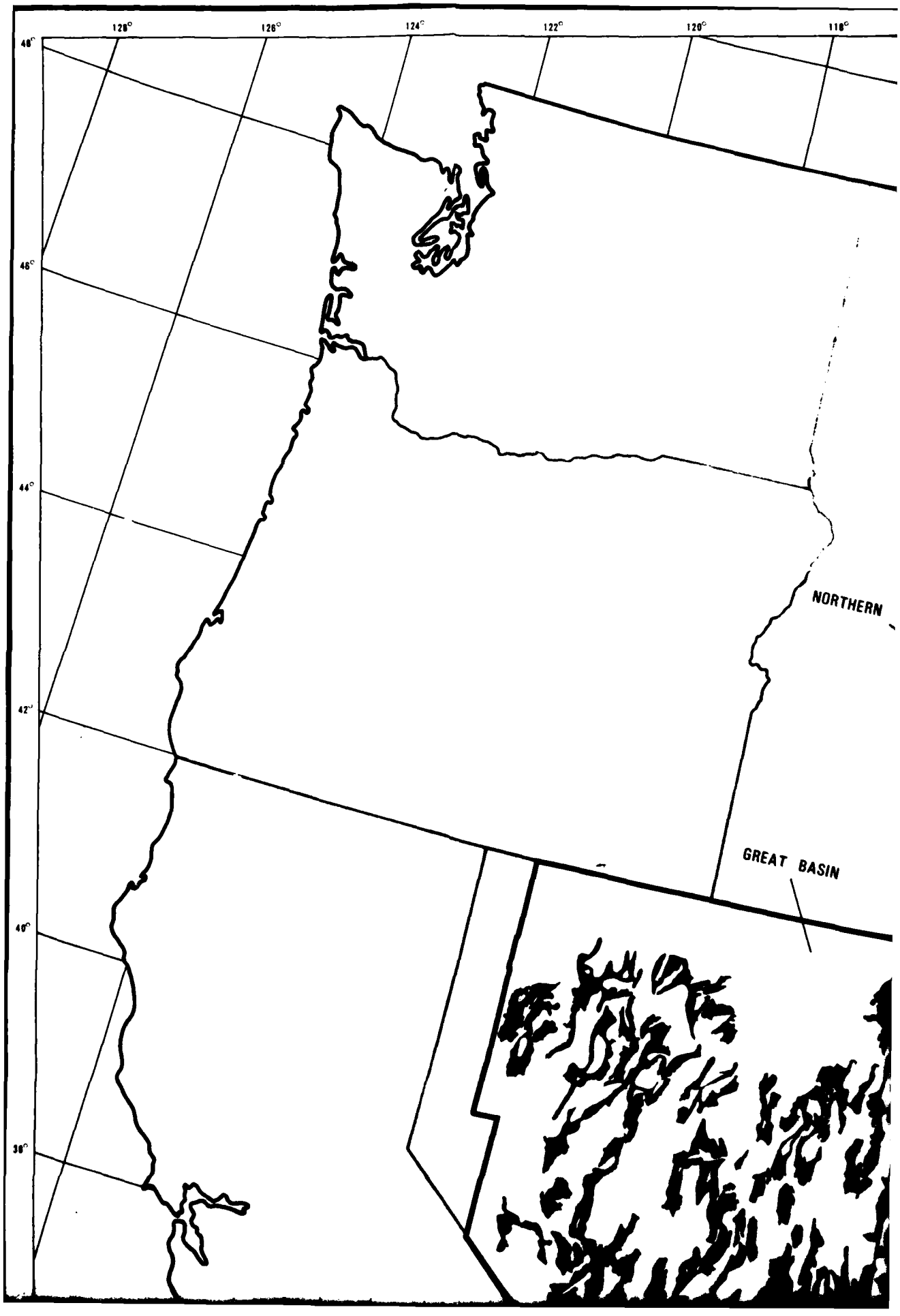

ELLIS BOMBING
AND GUNNERY RANGE
PLATEAU
RIO GRANDE
HIGHLANDS
WHITE SANDS
MISSILE
RANGE
LUKE BOMBING AND
GUNNERY RANGE
FT BLISS MILITARY
RESERVATION

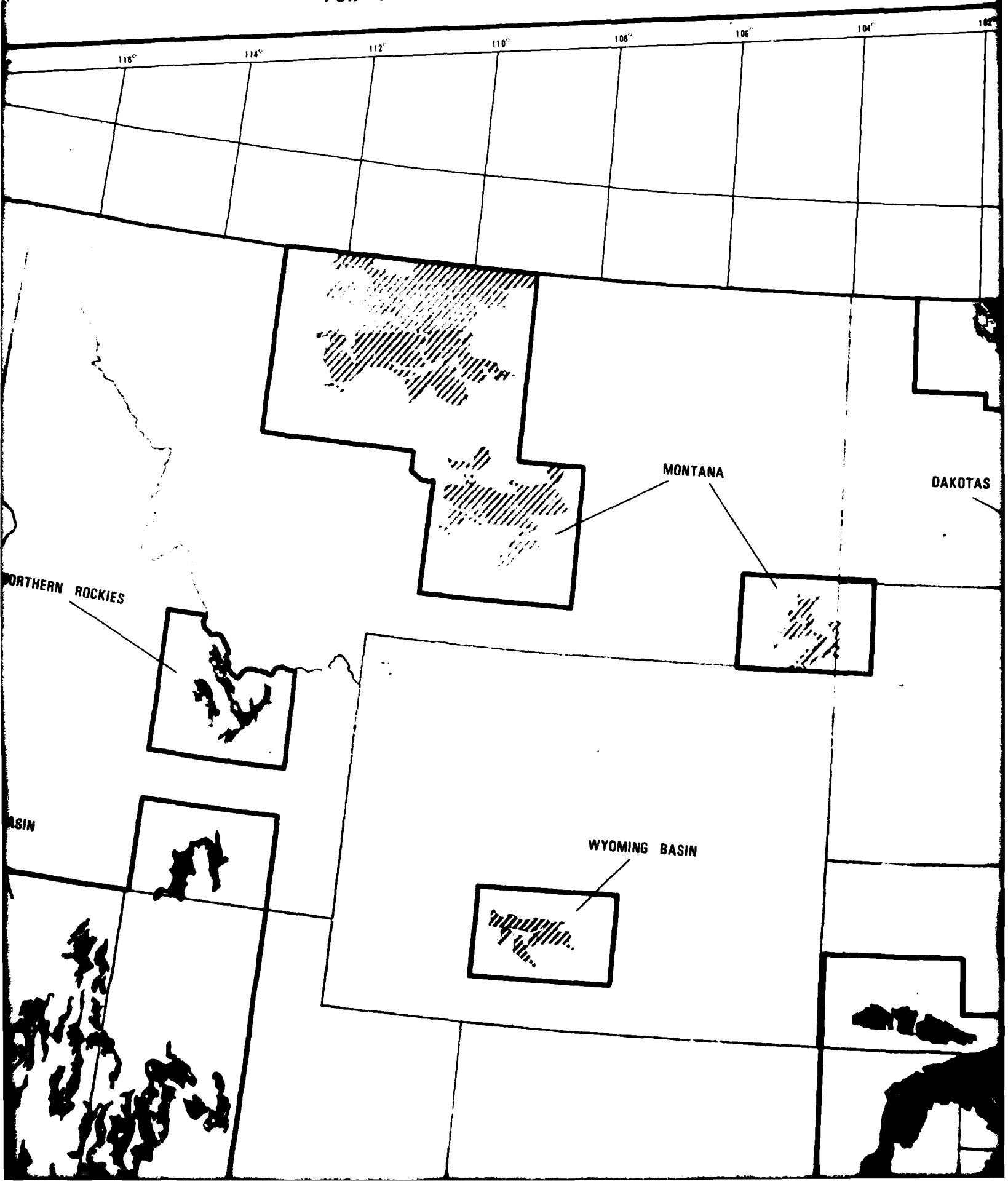

CENTRAL HIGH PLAINS
SOUTHERN HIGH PLAINS
COASTAL PLAIN
40°
36°
34°
32°
30°


SONORAN
YUMA PROVING GROUNDS
LUKE BOMBING AND GUNNERY RANGE
32
30
28
26
24
118
116
114
112
EXPLANATION
SUITABLE MX SITING AREA - FINE SCREENING
SUITABLE MX SITING AREA - INTERMEDIATE SCREENING
SUITABLE EXCAVATABLE ROCK AREAS DEFINED BY INTERMEDIATE SCREENING
UNSUITABLE AREAS DEFINED BY INTERMEDIATE SCREENING
CANDIDATE SITING PROVINCE (CSP) BOUNDARY
STATE BOUNDARY
1:5,000,000
0 50 100 150 200
NAUTICAL MILES
0 50 100 150 200
STATUTE MILES
0 50 100 150 200
KILOMETERS
BASE MAP REFERENCE: Albers equal-area projection based on standard parallels 29½° and 45½°; Compiled by the U.S. Geological Survey - 1927 North American datum.

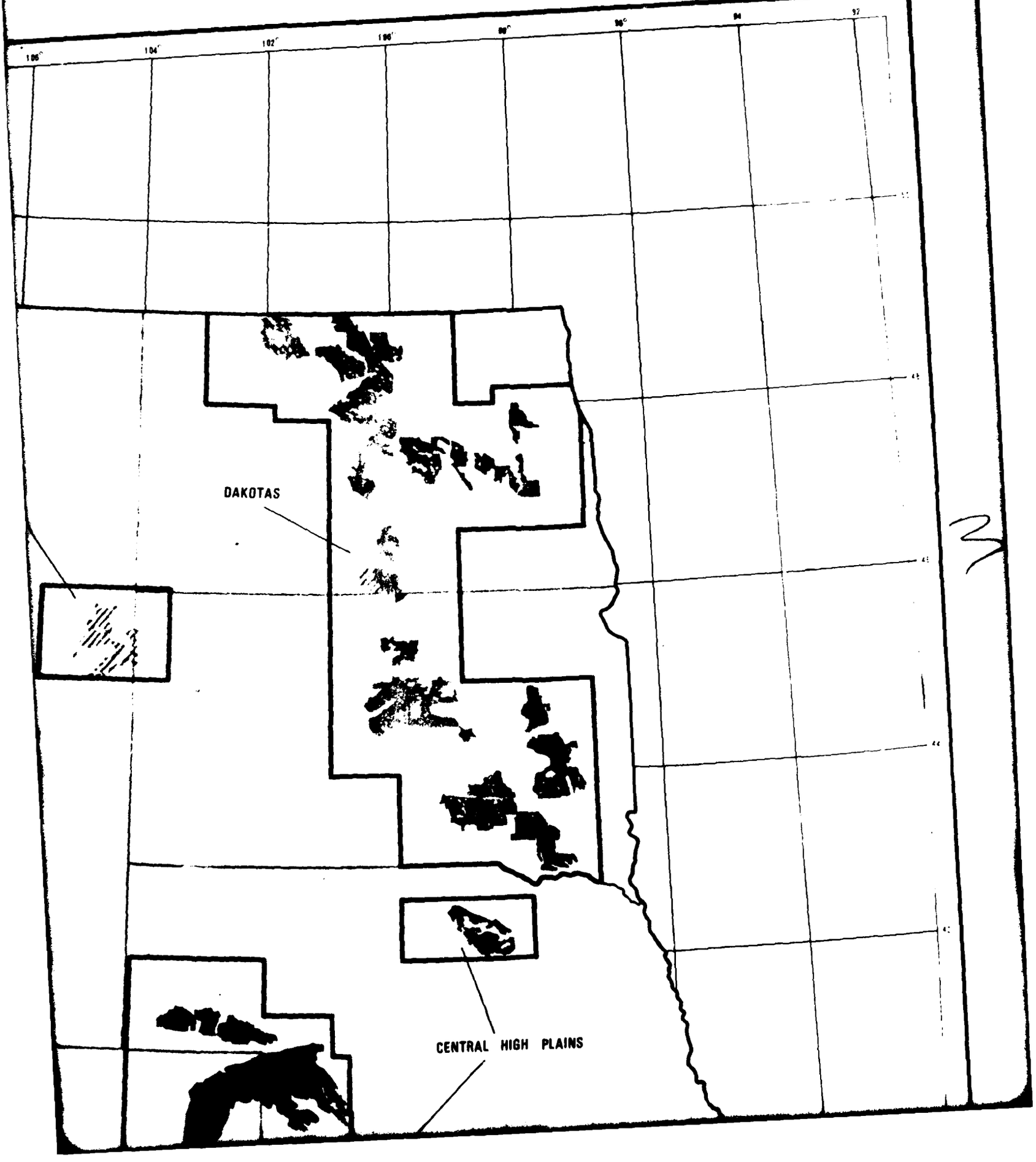

RIO GRANDE
HIGHLANDS
WHITE SANDS MISSILE RANGE
LUKE BOMBING AND GUNNERY RANGE
FT. BLISS MILITARY RESERVATION
110°
108°
106°
104°
102°

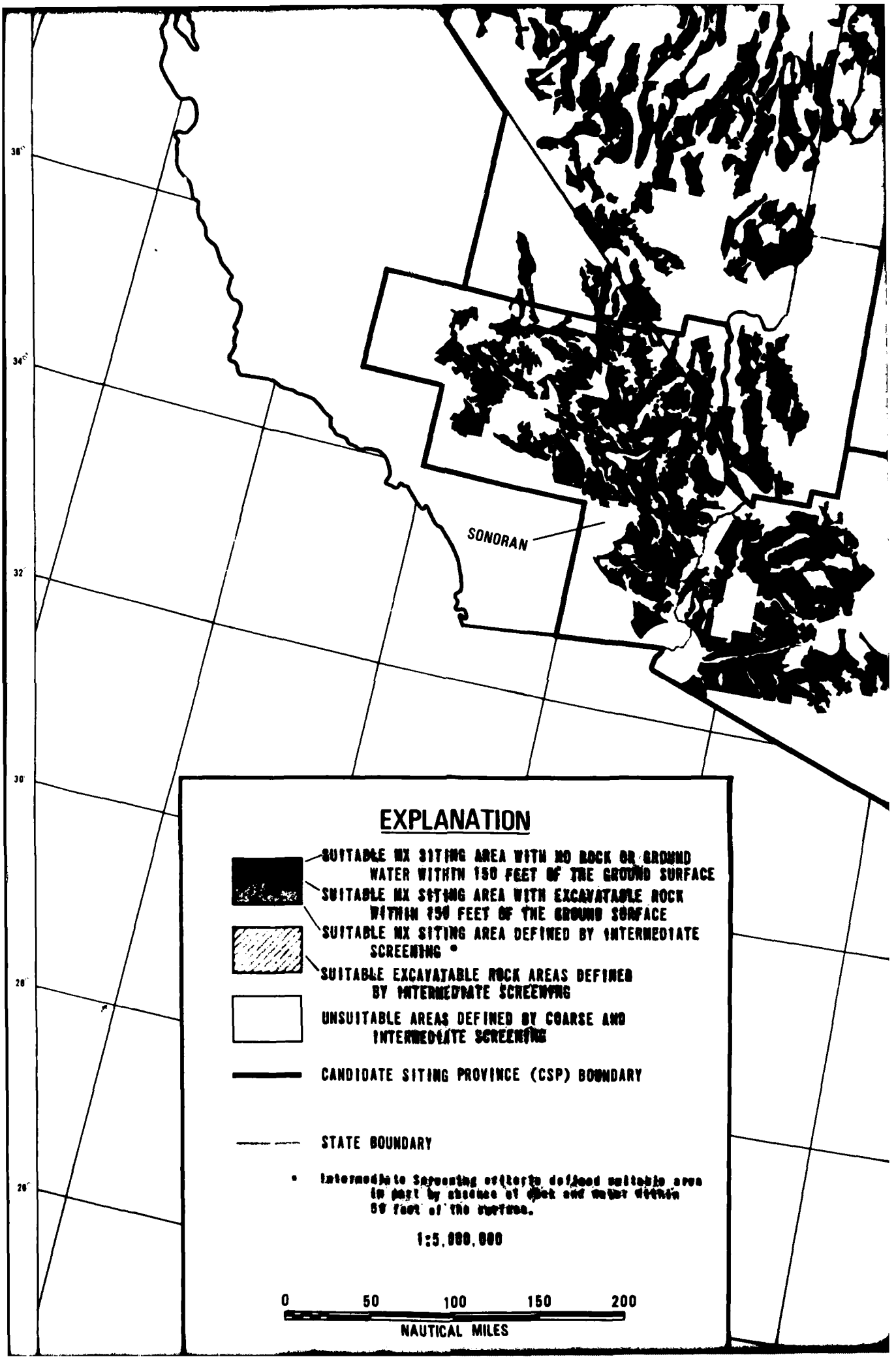

SOUTHERN HIGH PLAINS
COASTAL PLAIN
36°
34°
32°
30°
28°
26°
102°
100°
98°
96°
94°

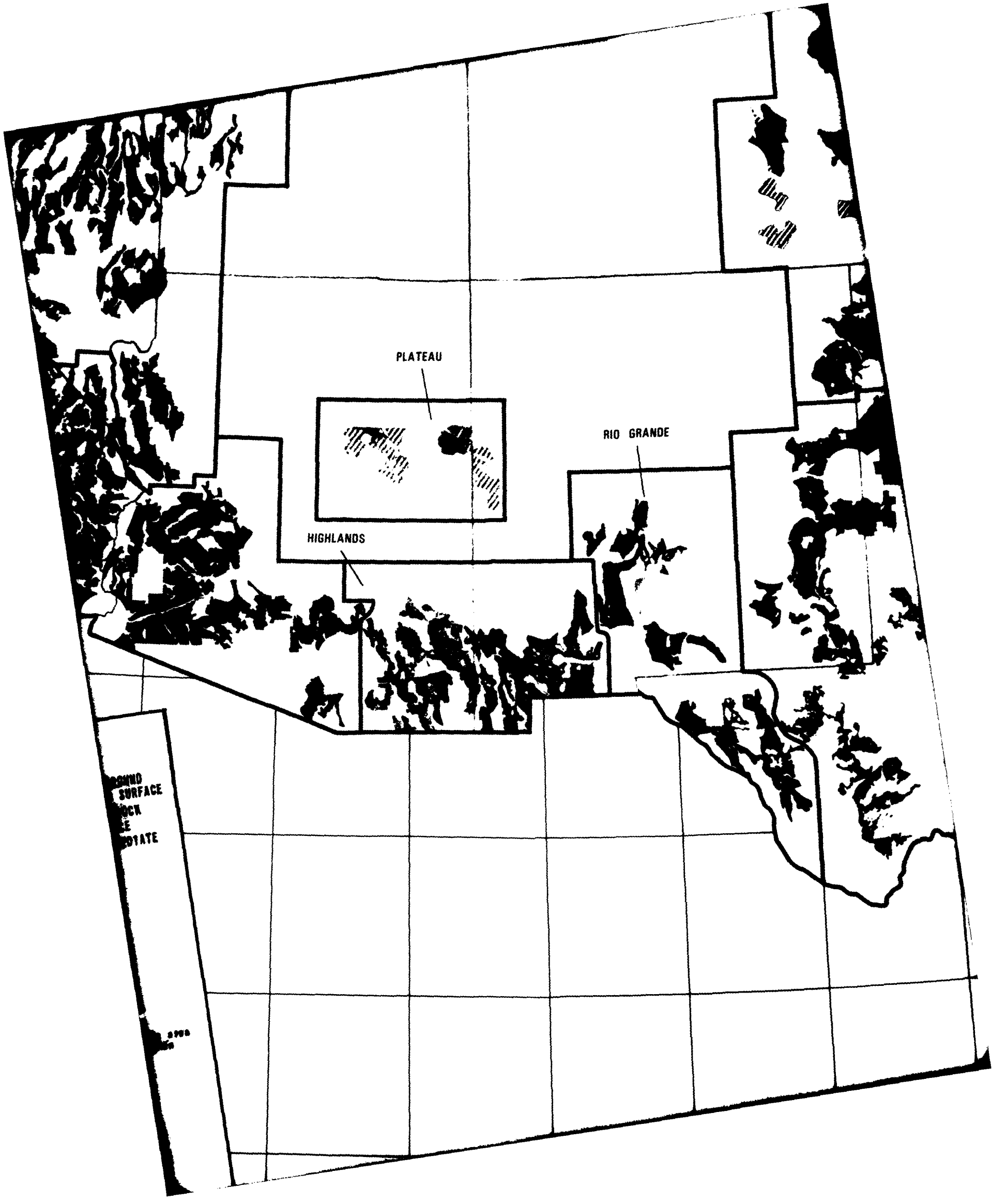

128°
126°
124°
122°
120°
118°
48°
46°
44°
42°
40°
38°
NORTHERN
GREAT BASIN

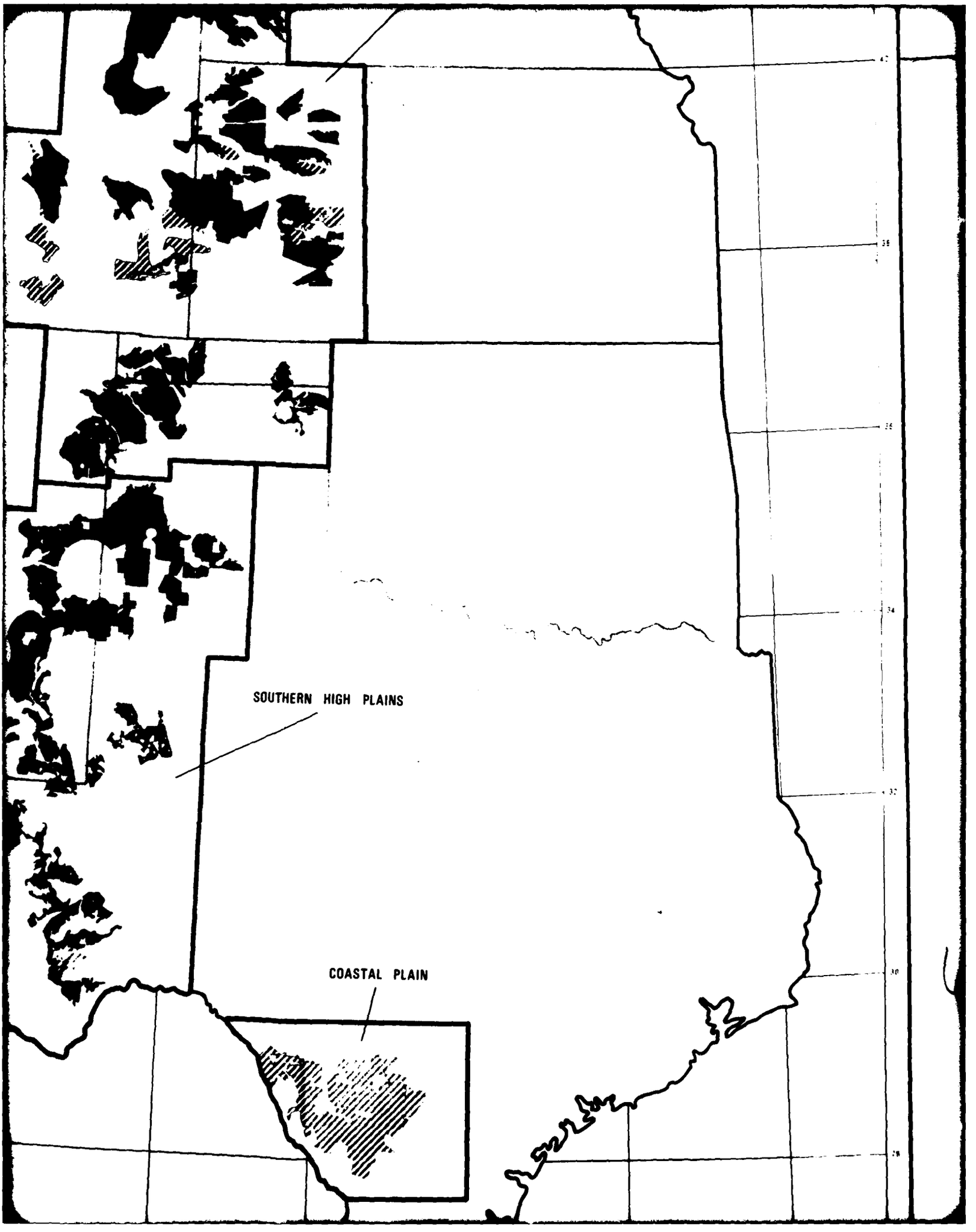

116°
114°
112°
110°
108°
106°
104°
MONTANA
DAKOTAS
ORTHERN ROCKIES
ASIN
WYOMING BASIN

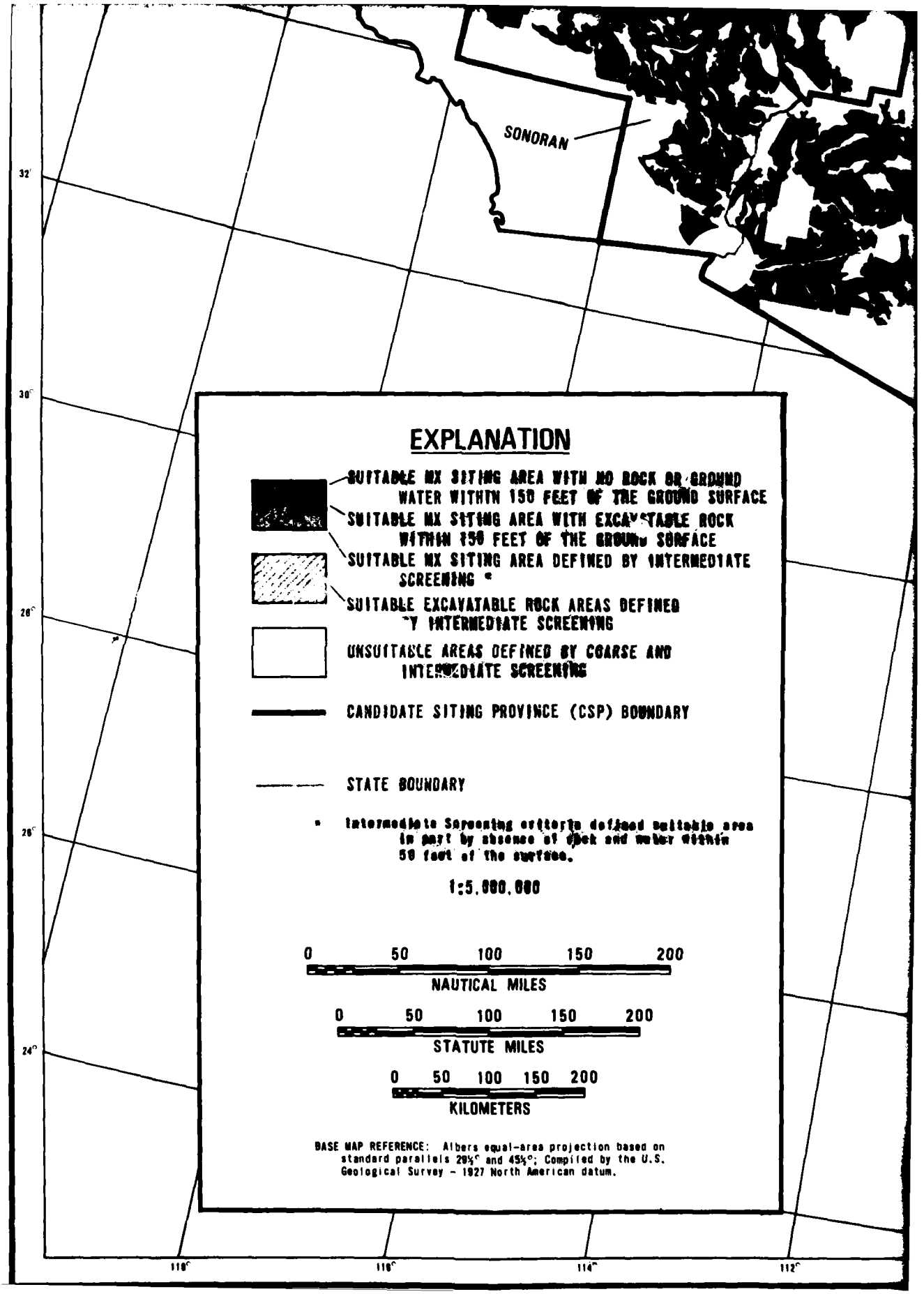
FINE SCREENING-ROCK/WATER DEPTH EVALUATION
DRAWING 2.3-B

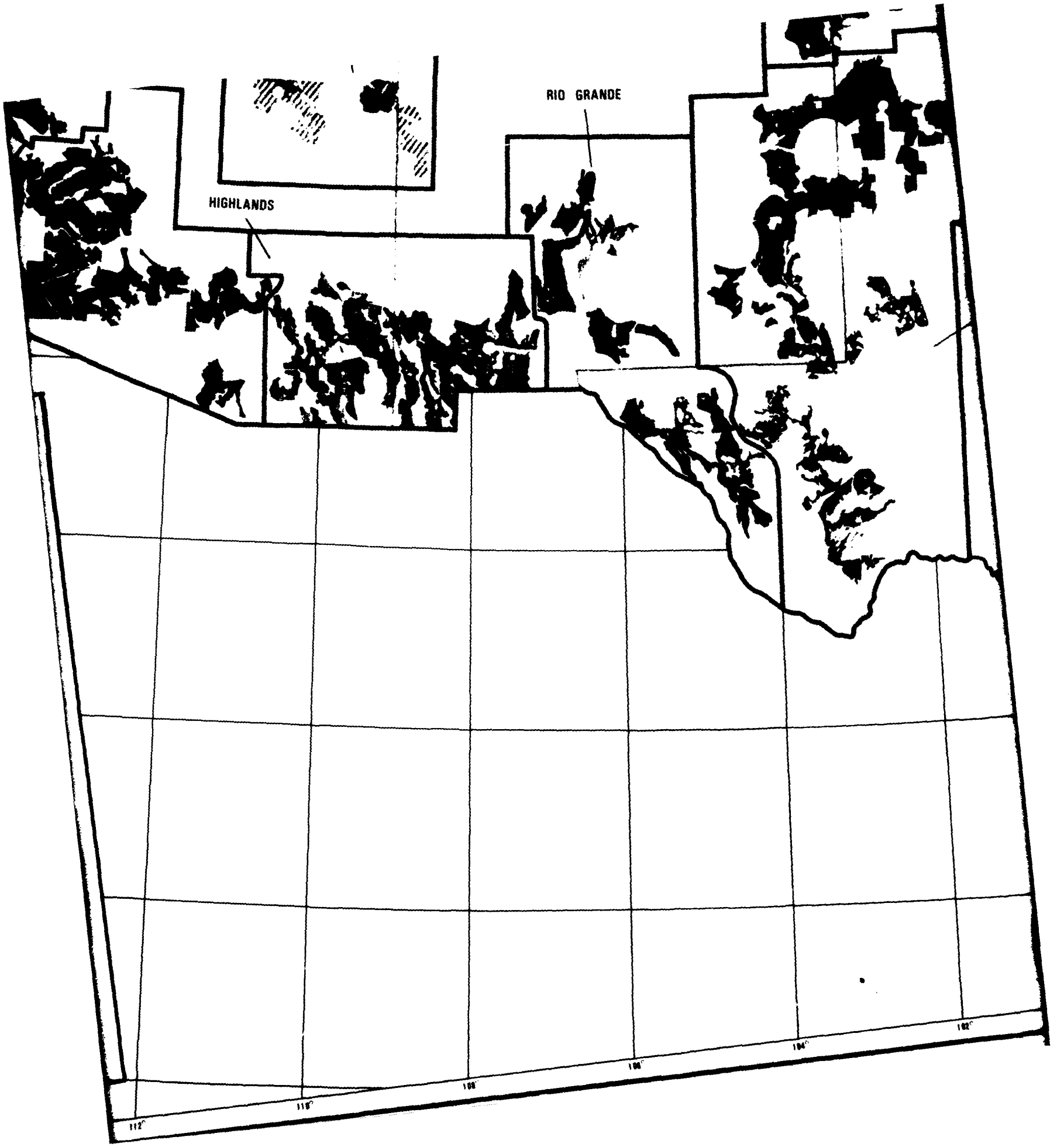


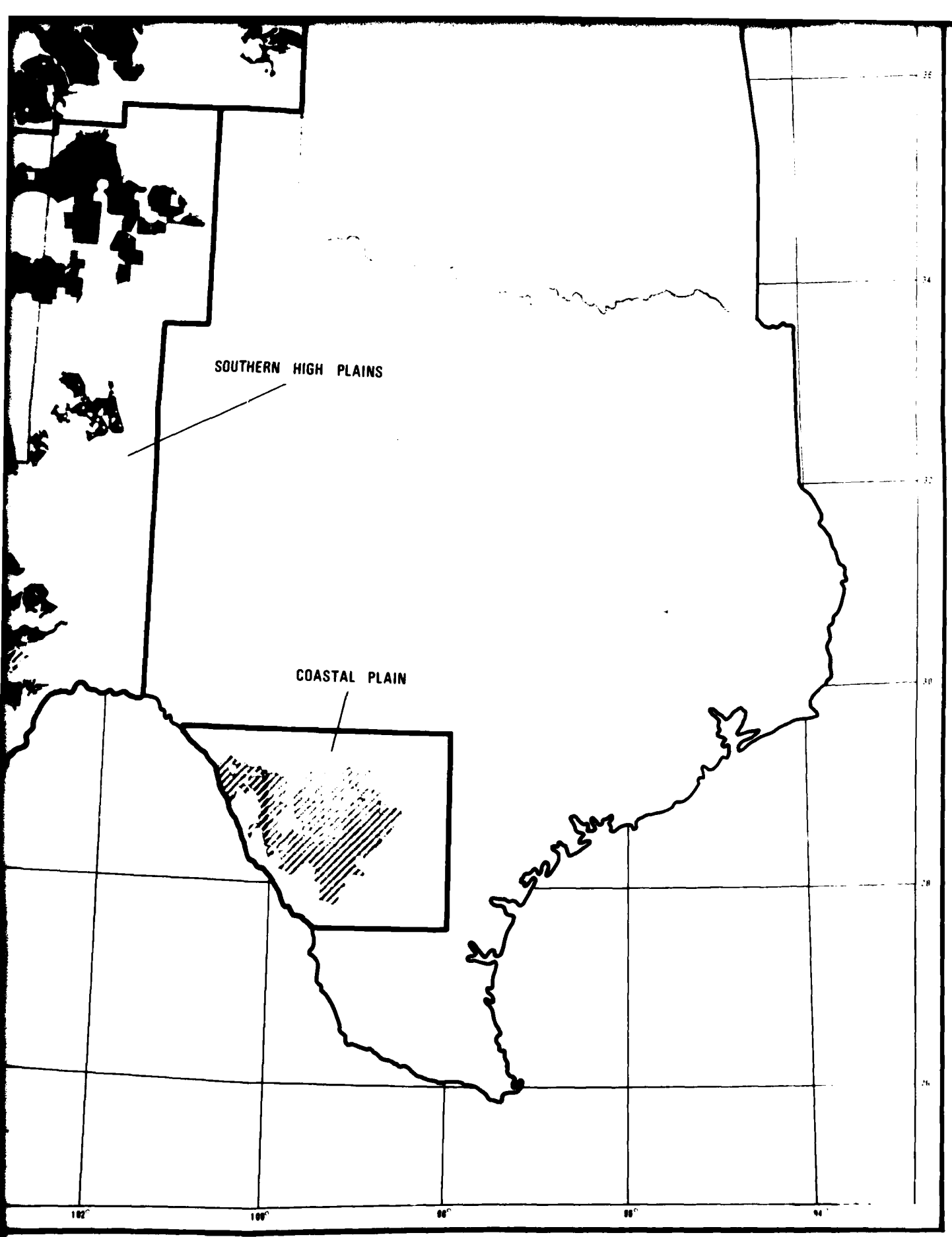

SONORAN
EXPLANATION
SUITABLE MX SITING AREA WITH NO ROCK OR GROUND WATER WITHIN 150 FEET OF THE GROUND SURFACE
SUITABLE MX SITING AREA WITH EXCAVATABLE ROCK WITHIN 150 FEET OF THE GROUND SURFACE
SUITABLE MX SITING AREA DEFINED BY INTERMEDIATE SCREENING *
SUITABLE EXCAVATABLE ROCK AREAS DEFINED BY INTERMEDIATE SCREENING
UNSUITABLE AREAS DEFINED BY COARSE AND INTERMEDIATE SCREENING
CANDIDATE SITING PROVINCE (CSP) BOUNDARY
STATE BOUNDARY
* Intermediate Screening criteria defined suitable area in part by absence of rock and water within 50 feet of the surface.
1:5,000,000
0 50 100 150 200
NAUTICAL MILES


PLATEAU
RIO GRANDE
HIGHLANDS

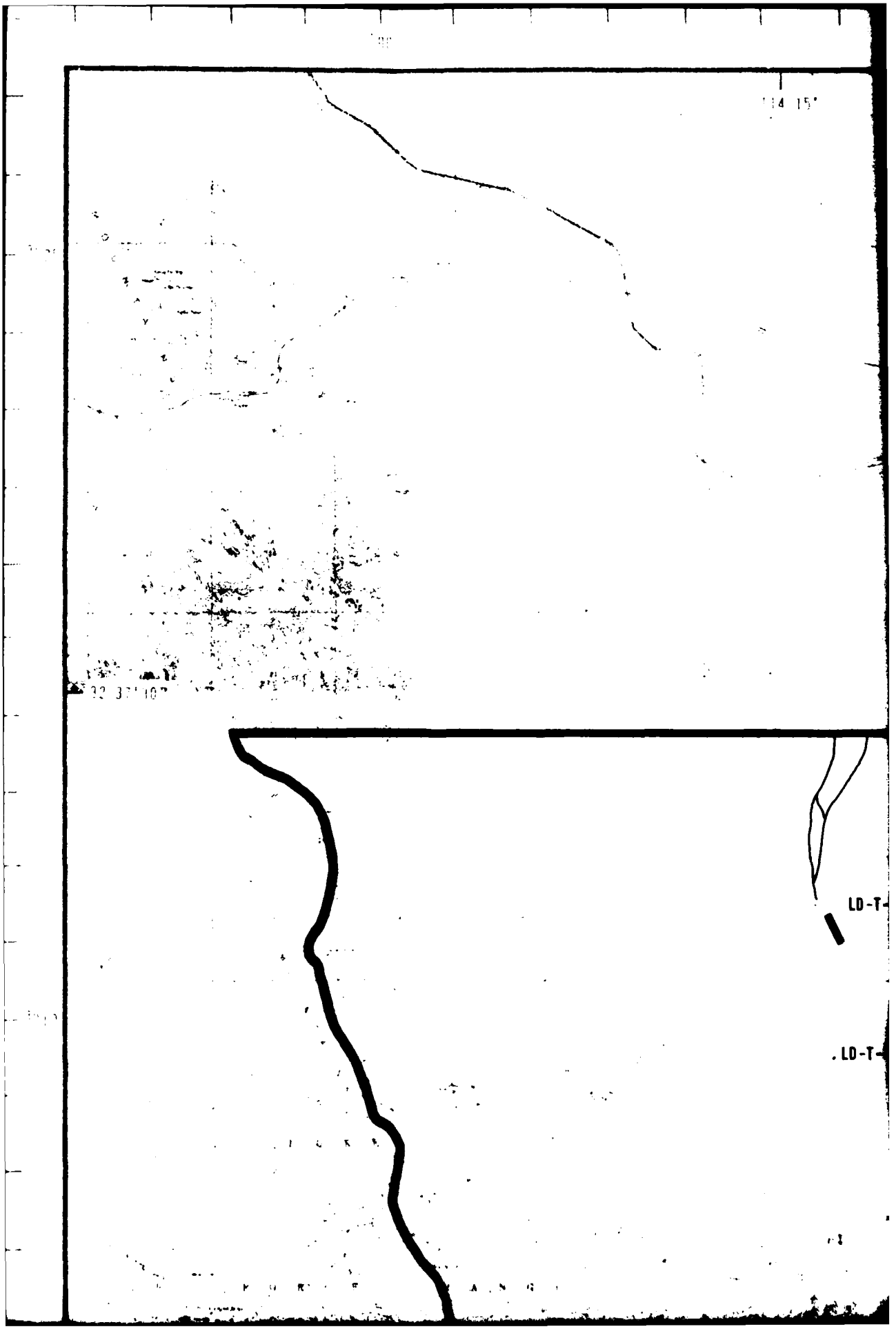

SOUTHERN HIGH PLAINS
COASTAL PLAIN

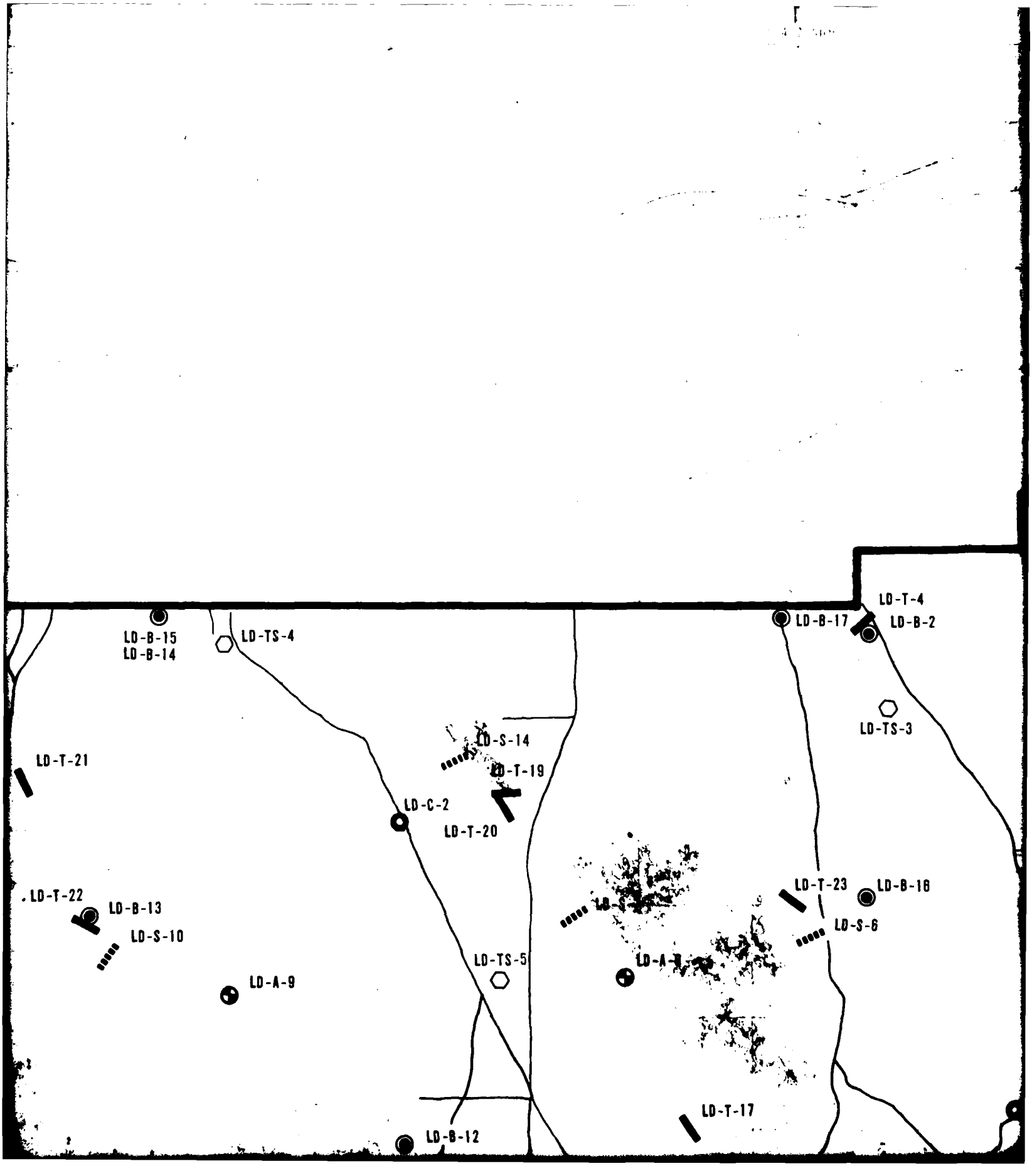

SONORAN
32°
30°
28°
26°
24°
118°
116°
114°
112°
EXPLANATION
SUITABLE MX SITING AREA WITH NO ROCK OR GROUND WATER WITHIN 150 FEET OF THE GROUND SURFACE
SUITABLE MX SITING AREA WITH EXCAVATABLE ROCK WITHIN 150 FEET OF THE GROUND SURFACE
SUITABLE MX SITING AREA DEFINED BY INTERMEDIATE SCREENING *
SUITABLE EXCAVATABLE ROCK AREAS DEFINED BY INTERMEDIATE SCREENING
UNSUITABLE AREAS DEFINED BY COARSE AND INTERMEDIATE SCREENING
CANDIDATE SITING PROVINCE (CSP) BOUNDARY
STATE BOUNDARY
* Intermediate Screening criteria defined suitable area in part by absence of rock and water within 50 feet of the surface.
1:5,000,000
0 50 100 150 200
NAUTICAL MILES
0 50 100 150 200
STATUTE MILES
0 50 100 150 200
KILOMETERS
BASE MAP REFERENCE: Albers equal-area projection based on standard parallels 29½° and 45½°; Compiled by the U.S. Geological Survey - 1927 North American datum.

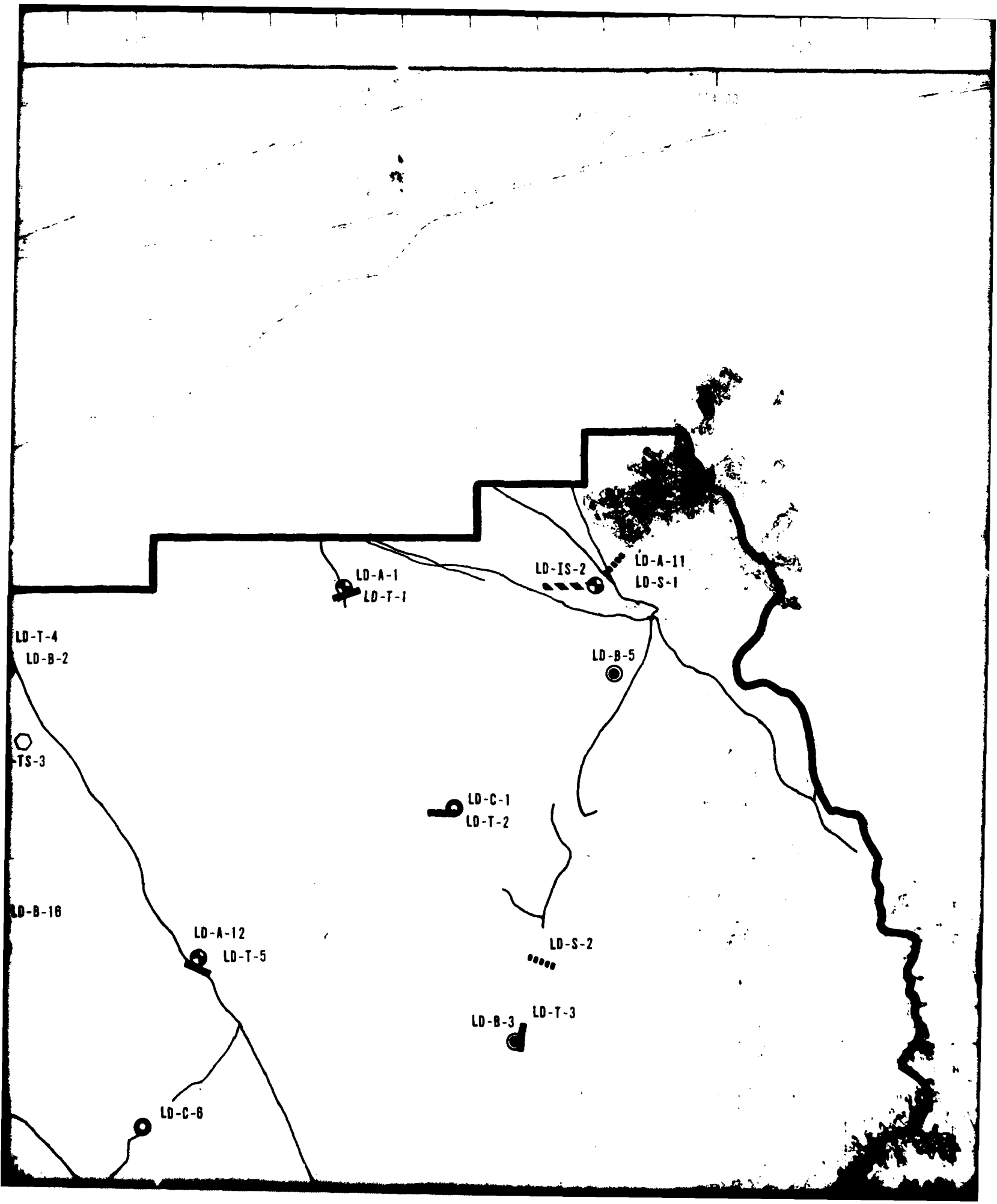

RIO GRANDE
HIGHLANDS
112°
118°
106°
104°
102°



FUGRO NATIONAL, INC.


LD-T-
.LD-T-


LD-B-15
LD-B-14
LD-TS-4
LD-T-4
LD-B-17
LD-B-2
LD-TS-3
LD-S-14
LD-T-21
LD-T-19
LD-C-2
LD-T-20
LD-T-22
LD-B-13
LD-S-10
LD-T-23
LD-B-16
LD-S-6
LD-TS-5
LD-A-9
LD-T-17
LD-B-12


LD-A-1
LD-T-1
LD-IS-2
LD-A-11
LD-S-1
LD-T-4
LD-B-2
LD-B-5
TS-3
LD-C-1
LD-T-2
LD-B-16
LD-A-12
LD-T-5
LD-S-2
LD-B-3
LD-T-3
LD-C-6

EXPLANATION

BORINGS AND TRENCHES



A–Boring to a nominal depth of 50 feet (15.2 meters)



B–Boring to a nominal depth of 100 feet (30.5 meters)



C–Boring to a nominal depth of 300 feet (91.4 meters)



D–Boring to a nominal depth of 1000 feet (304.8 meters)



Trench (not to scale)

SEISMIC REFRACTION LINES



Deep Seismic Reiraction Line



Intermediate Seismic Refraction Line



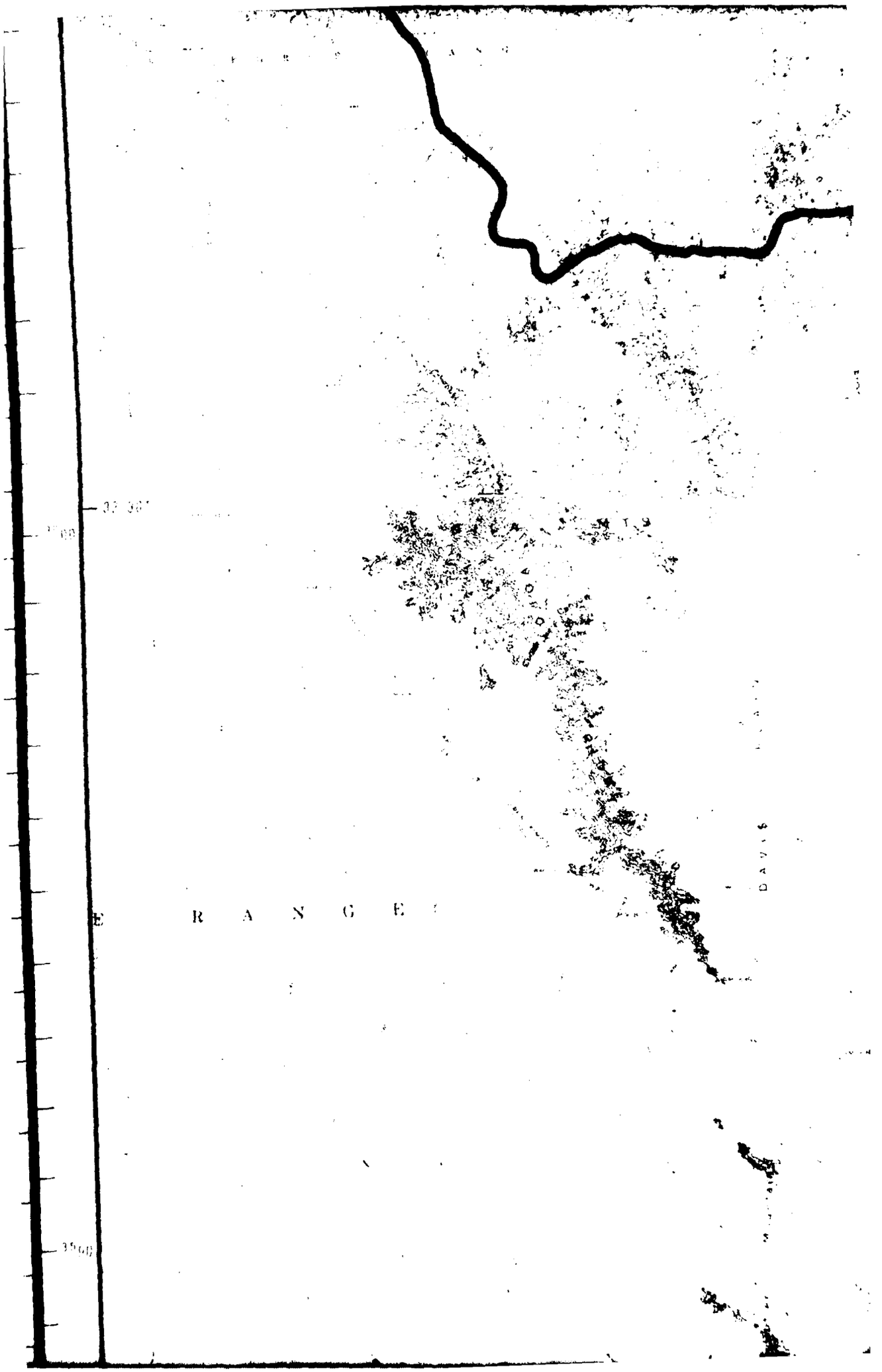
Shallow Seismic Refraction Line

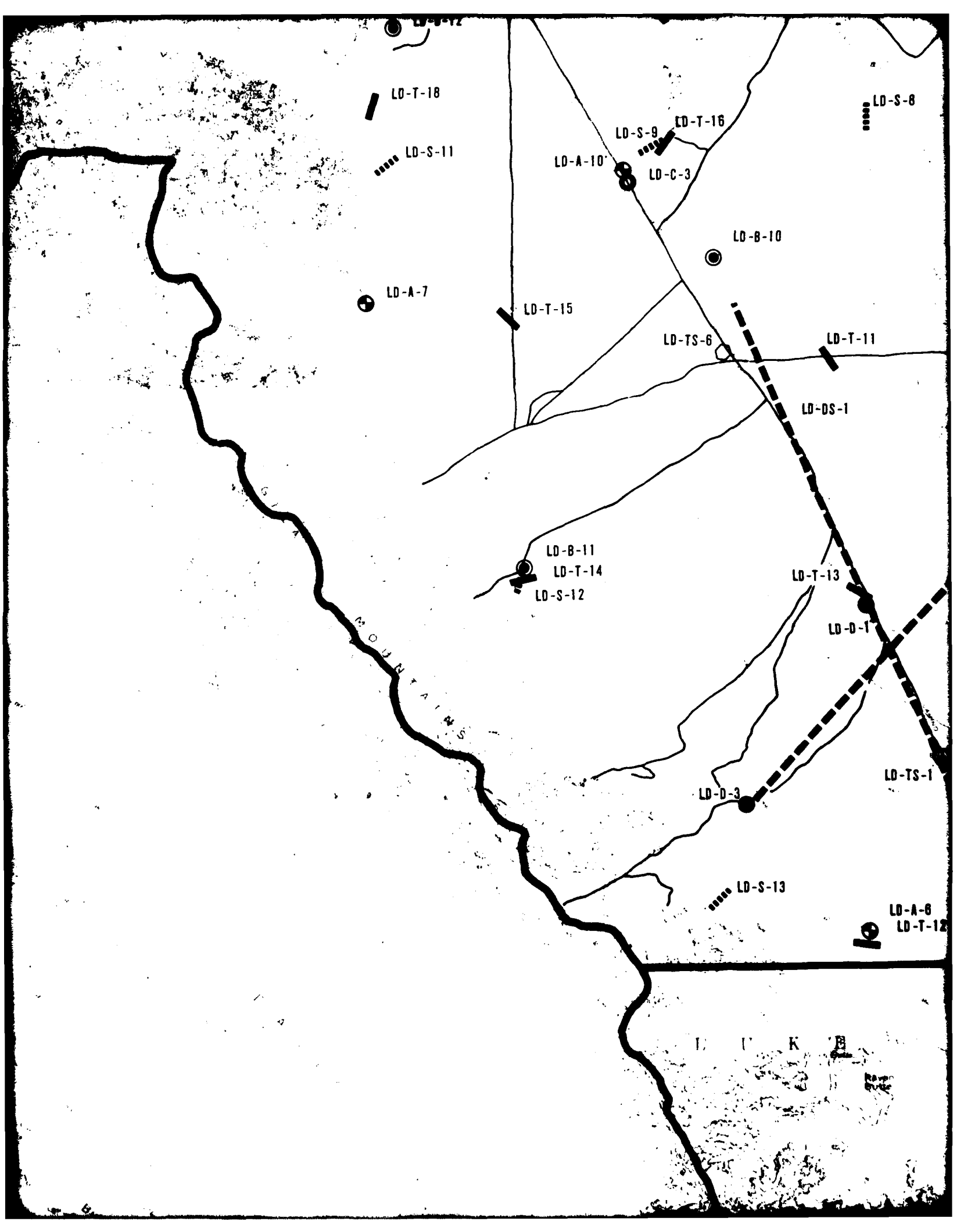
MISCELLANEOUS

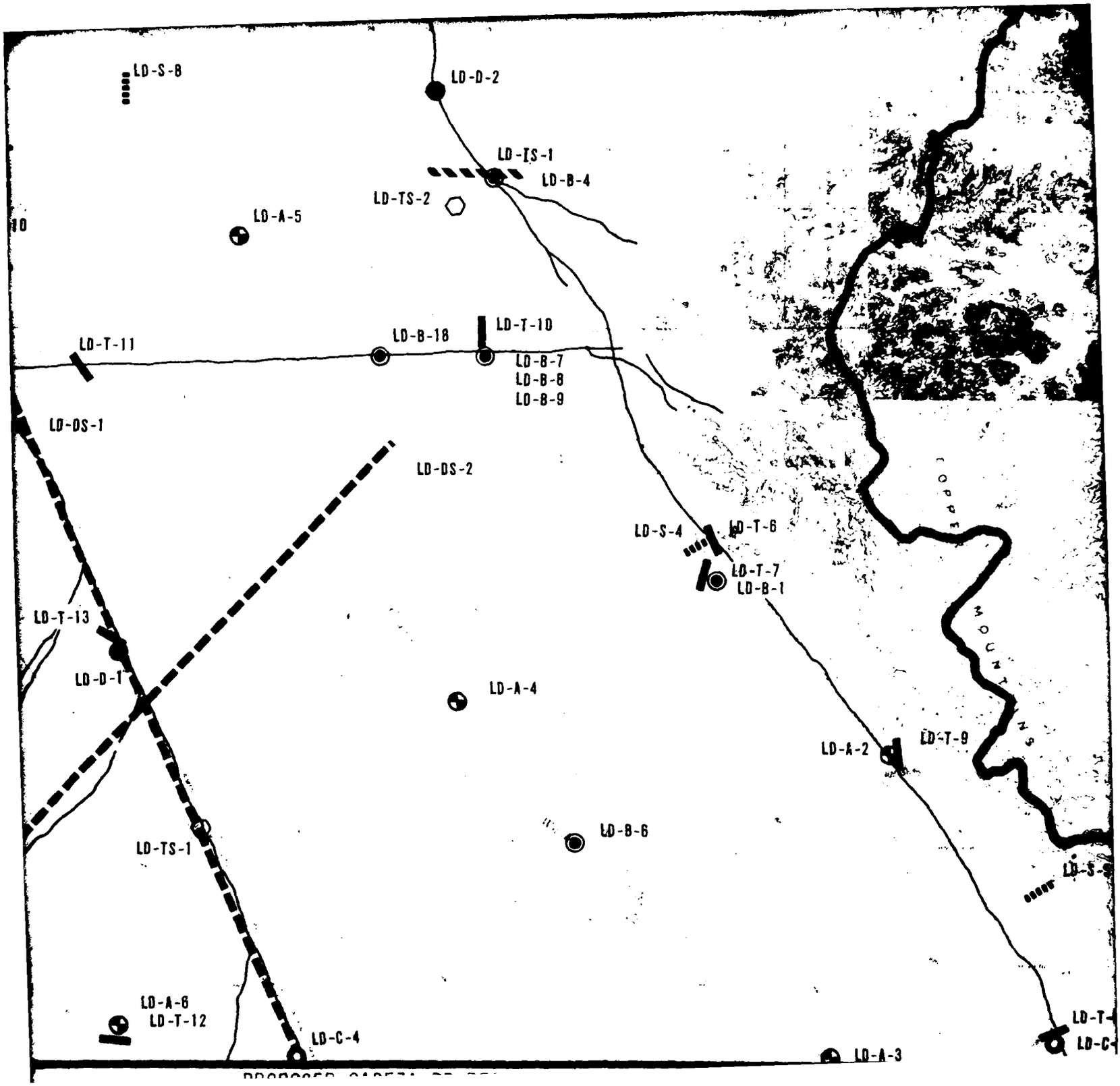


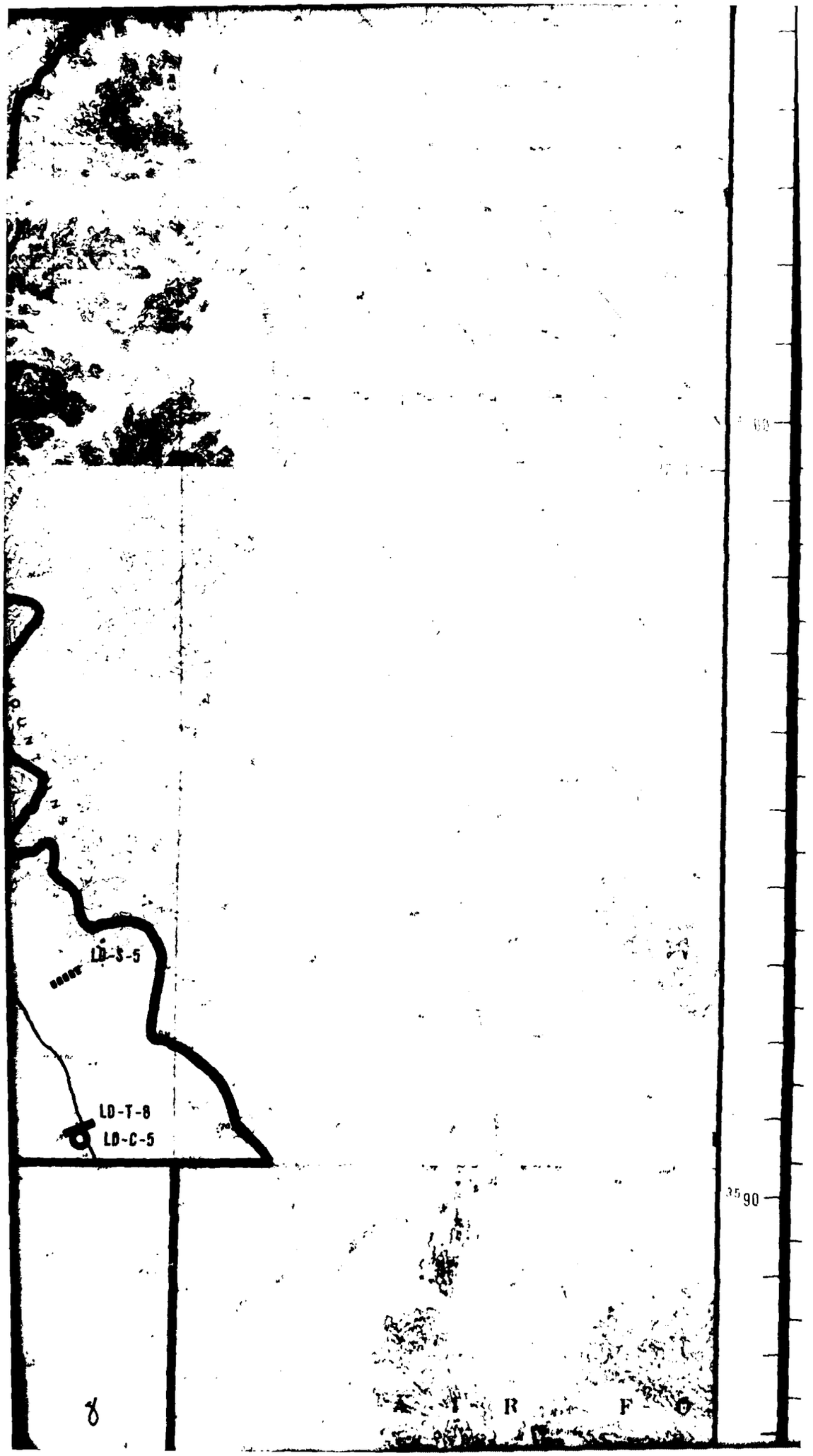
Transponder Remote Tower

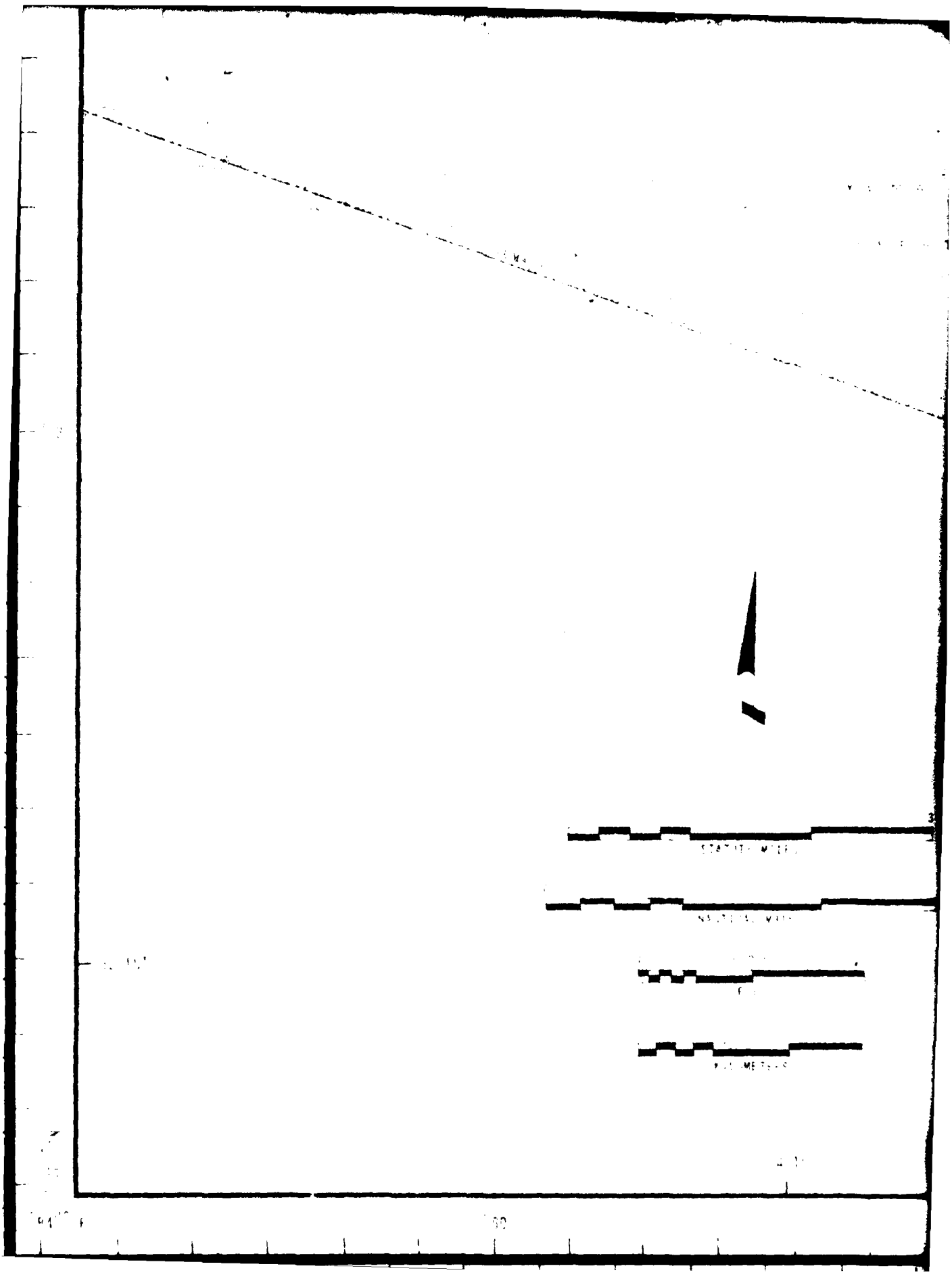
Existing Roads

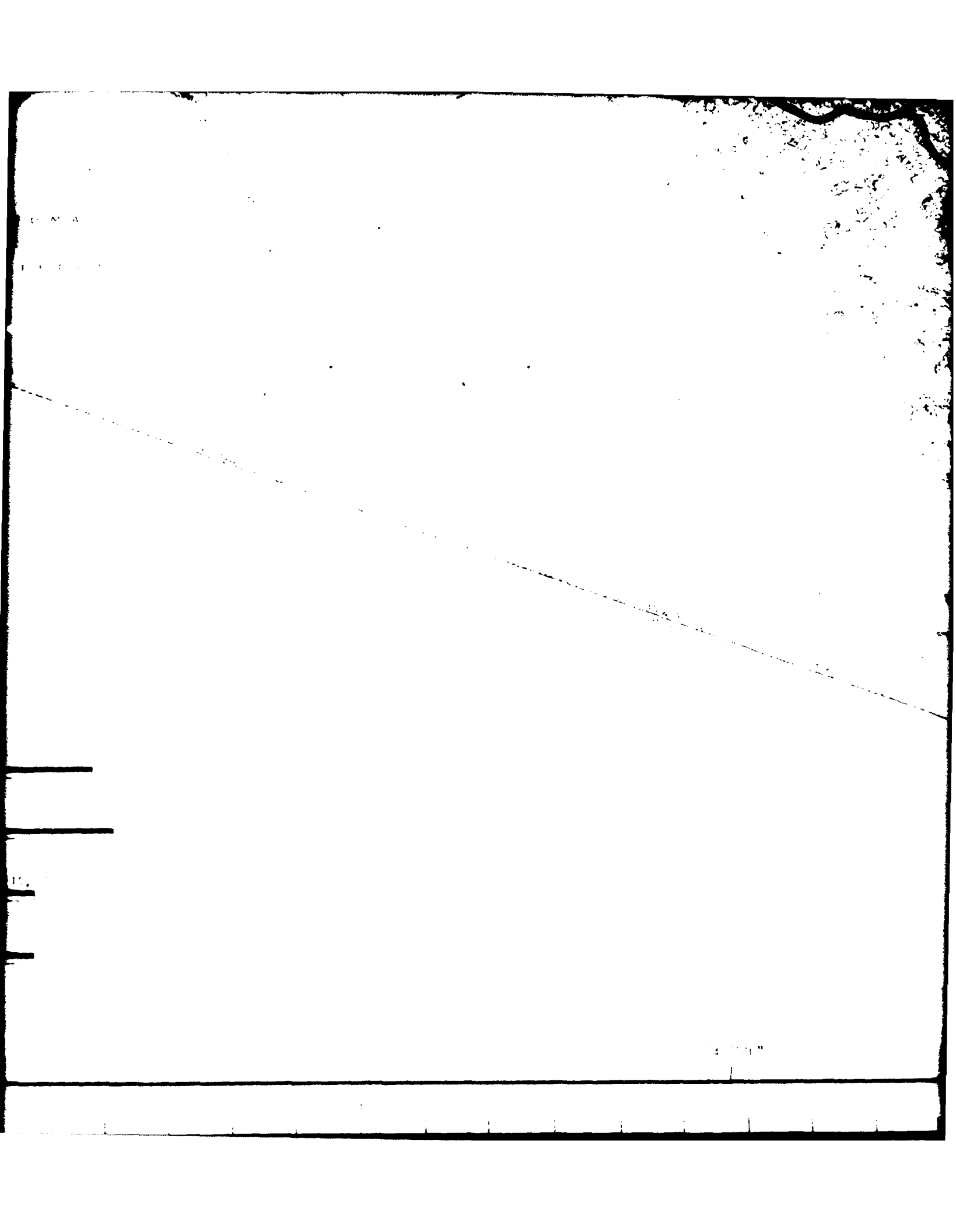

R A N G E
DAVIS

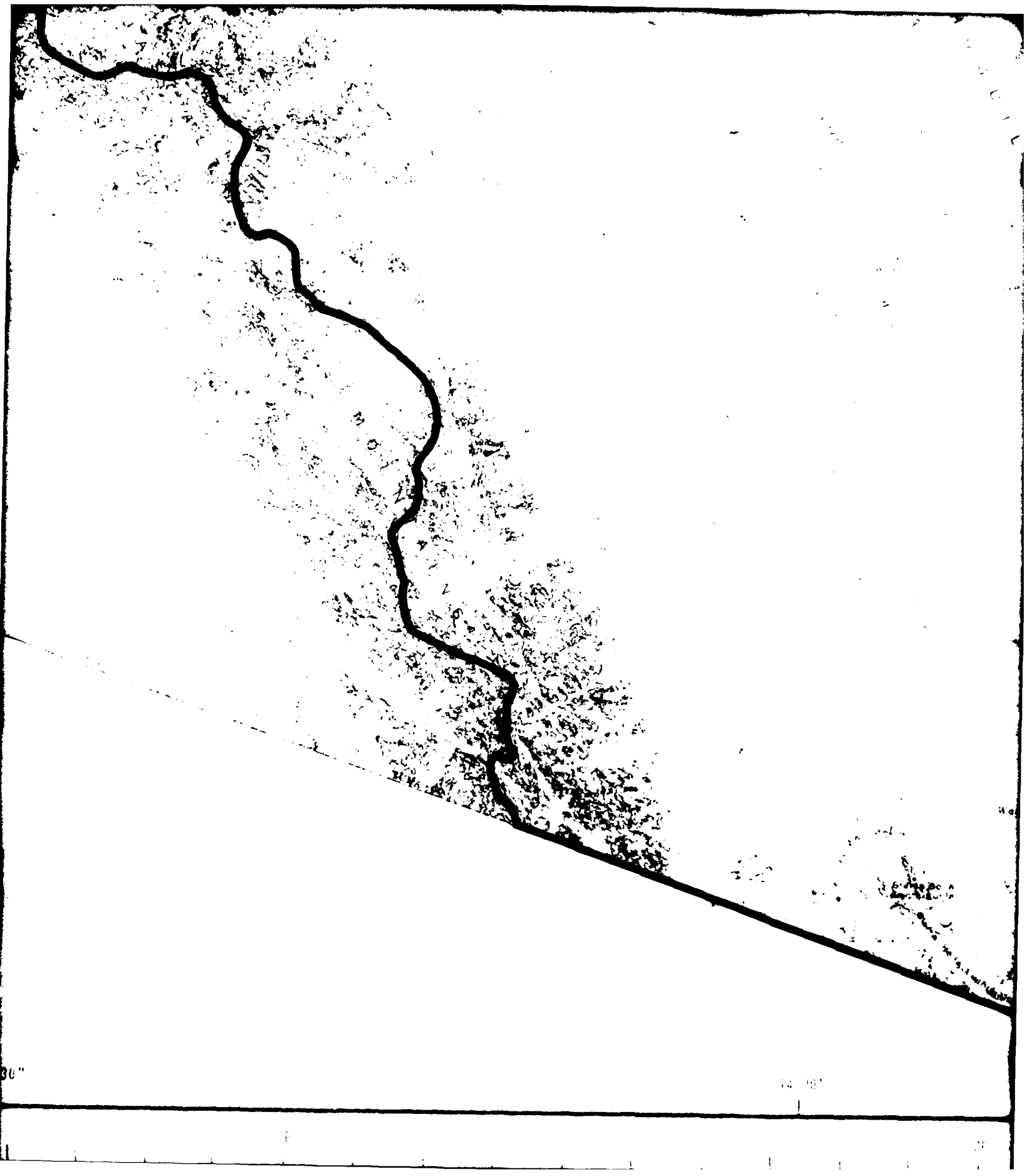

LD-T-18
LD-S-11
LD-A-7
LD-S-8
LD-T-16
LD-S-9
LD-A-10
LD-C-3
LD-B-10
LD-T-15
LD-TS-6
LD-T-11
LD-DS-1
LD-B-11
LD-T-14
LD-S-12
LD-T-13
LD-D-1
LD-TS-1
LD-D-3
LD-S-13
LD-A-6
LD-T-12

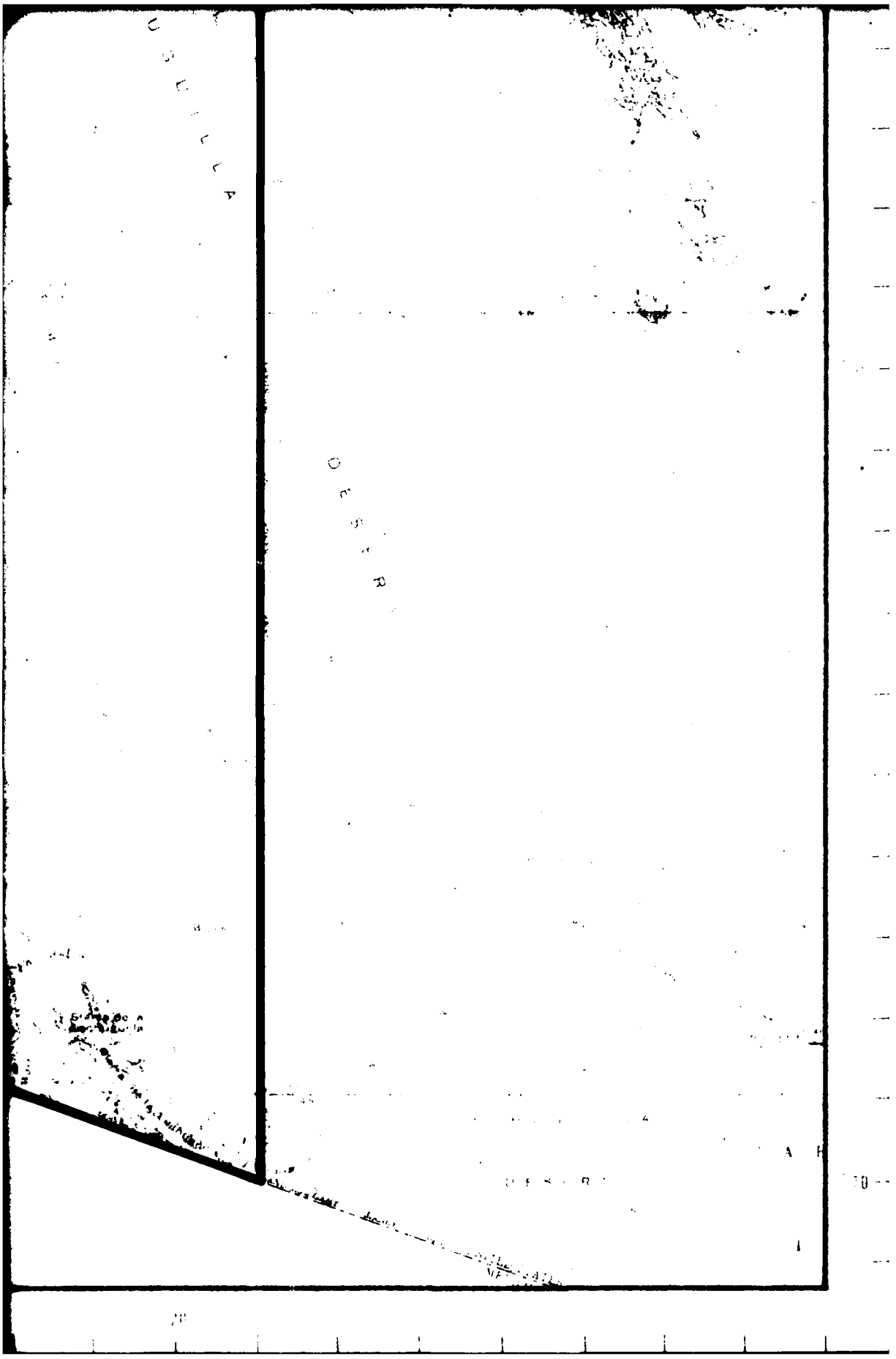

LD-S-8
LD-D-2
LD-IS-1
LD-B-4
LD-TS-2
LD-A-5
LD-T-11
LD-B-18
LD-T-10
LD-B-7
LD-B-8
LD-B-9
LD-DS-1
LD-DS-2
LD-S-4
LD-T-6
LD-T-7
LD-B-1
LD-T-13
LD-D-1
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LD-A-6
LD-T-12
LD-C-4
LD-A-3

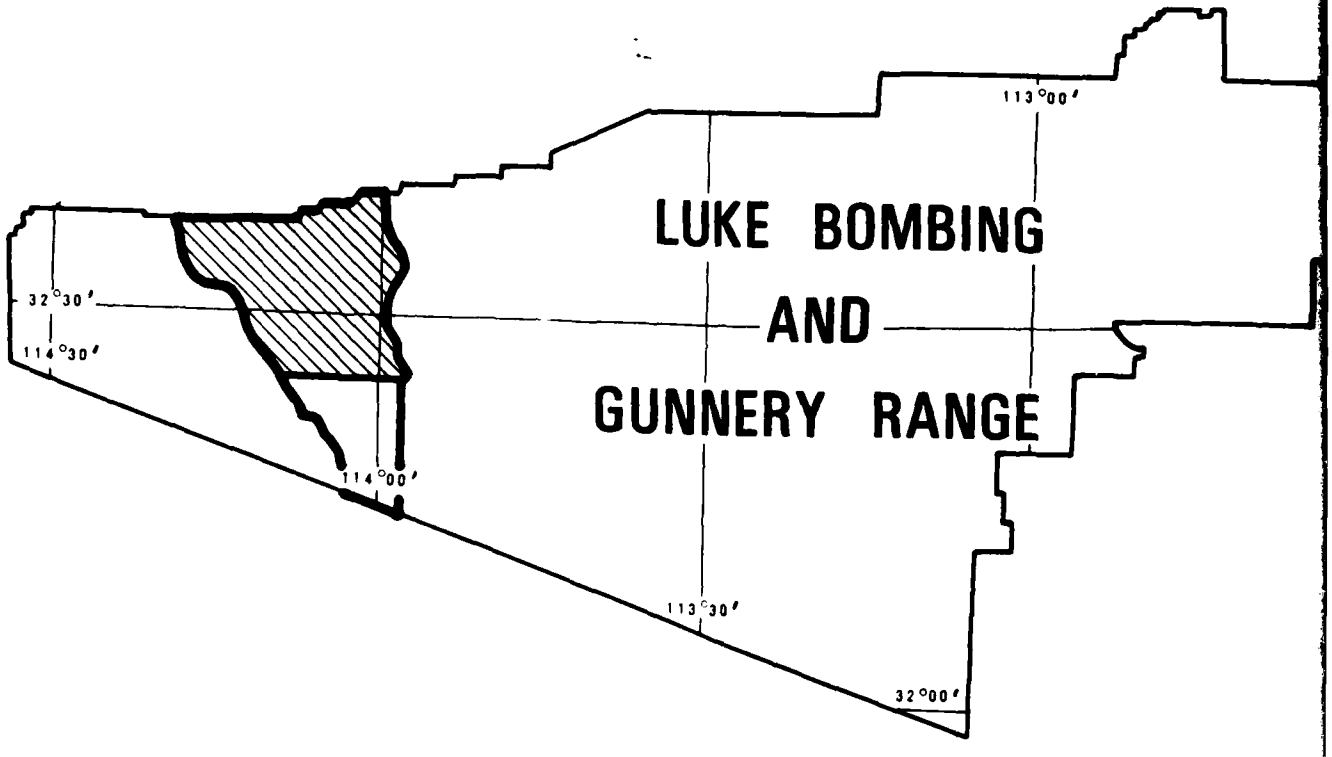

LD-S-5
LD-T-8
LD-C-5
3590

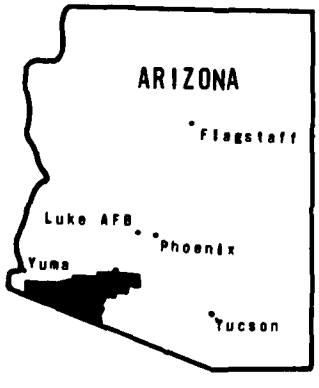








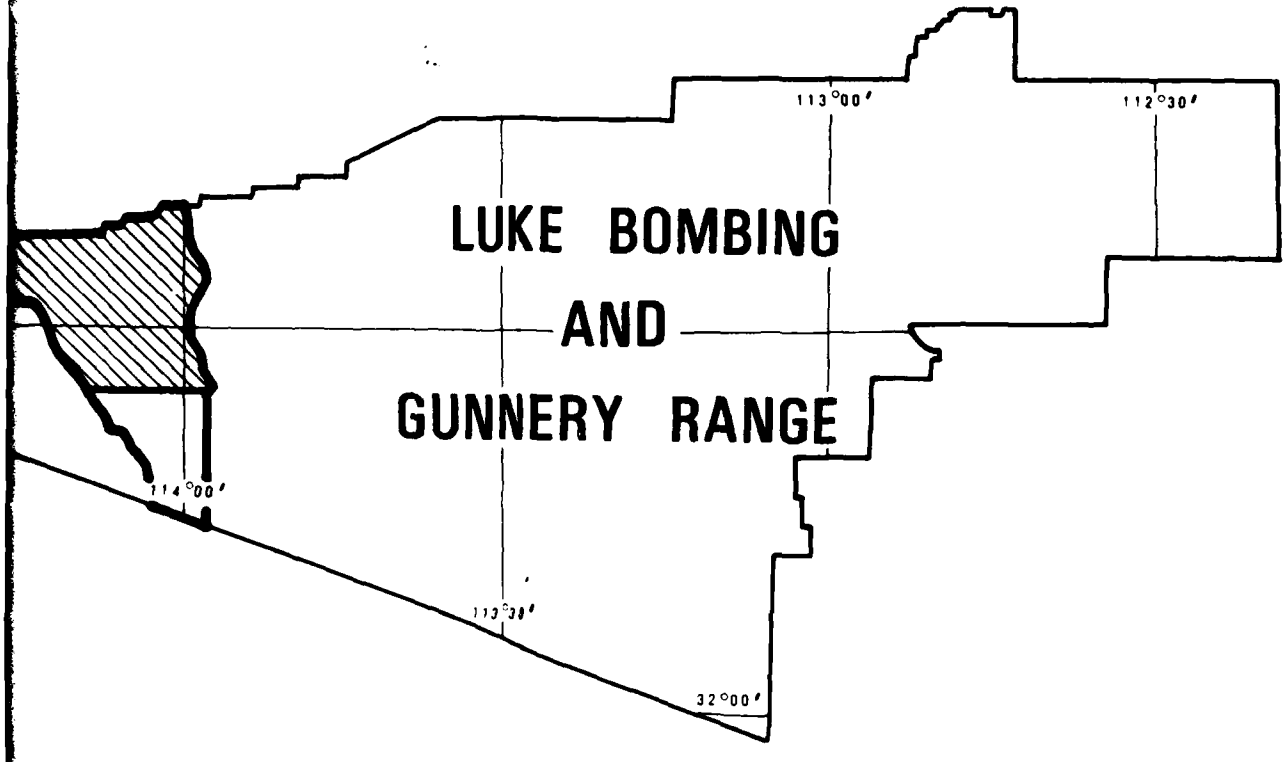




ACTIVITIES
LECHUGUILLA D

MX SITING INVESTIG
DEPARTMENT OF THE AIR FO

FUGRO NAT



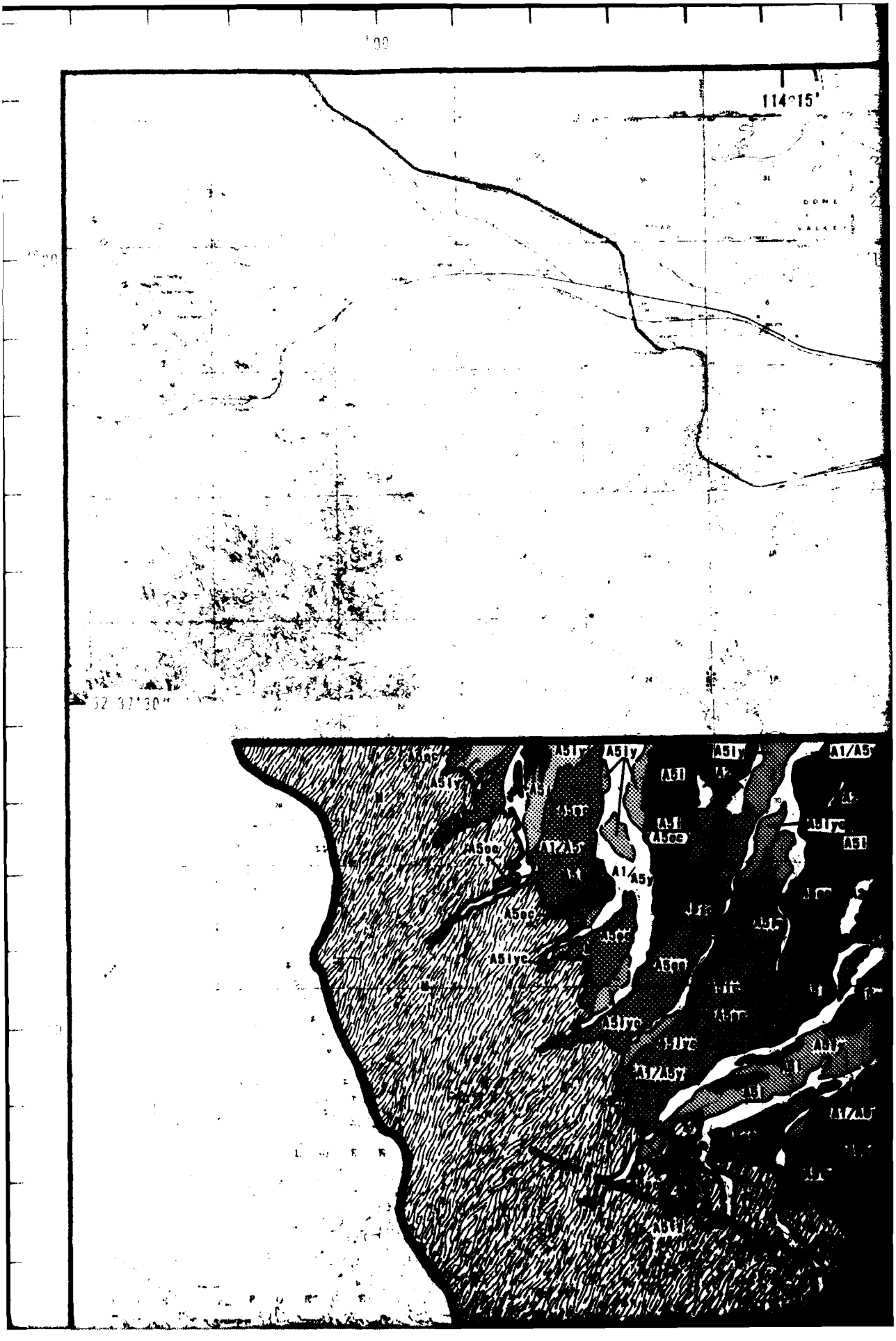


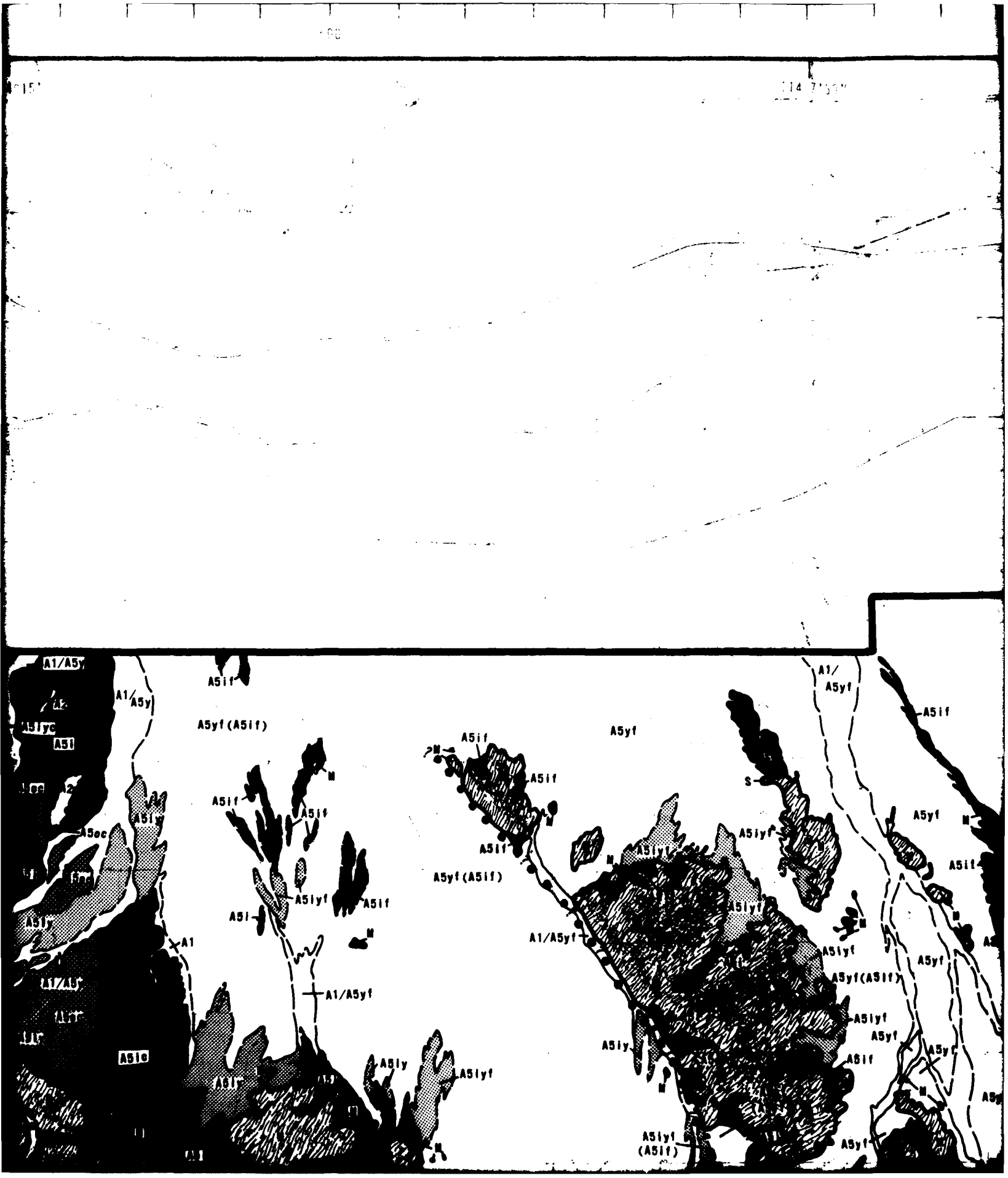
ACTIVITIES LOCATION MAP
LECHUGUILLA DESERT, ARIZONA

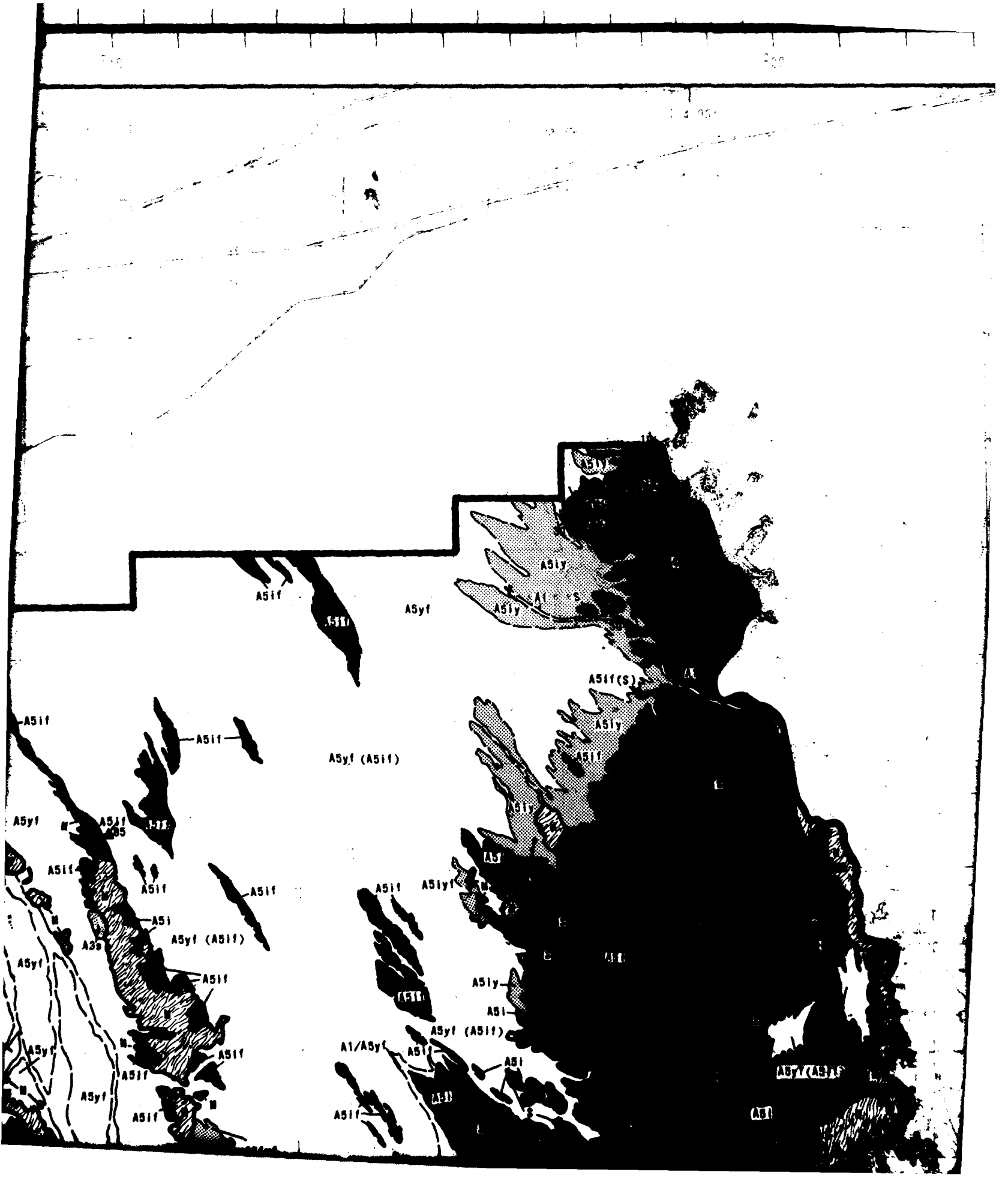
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

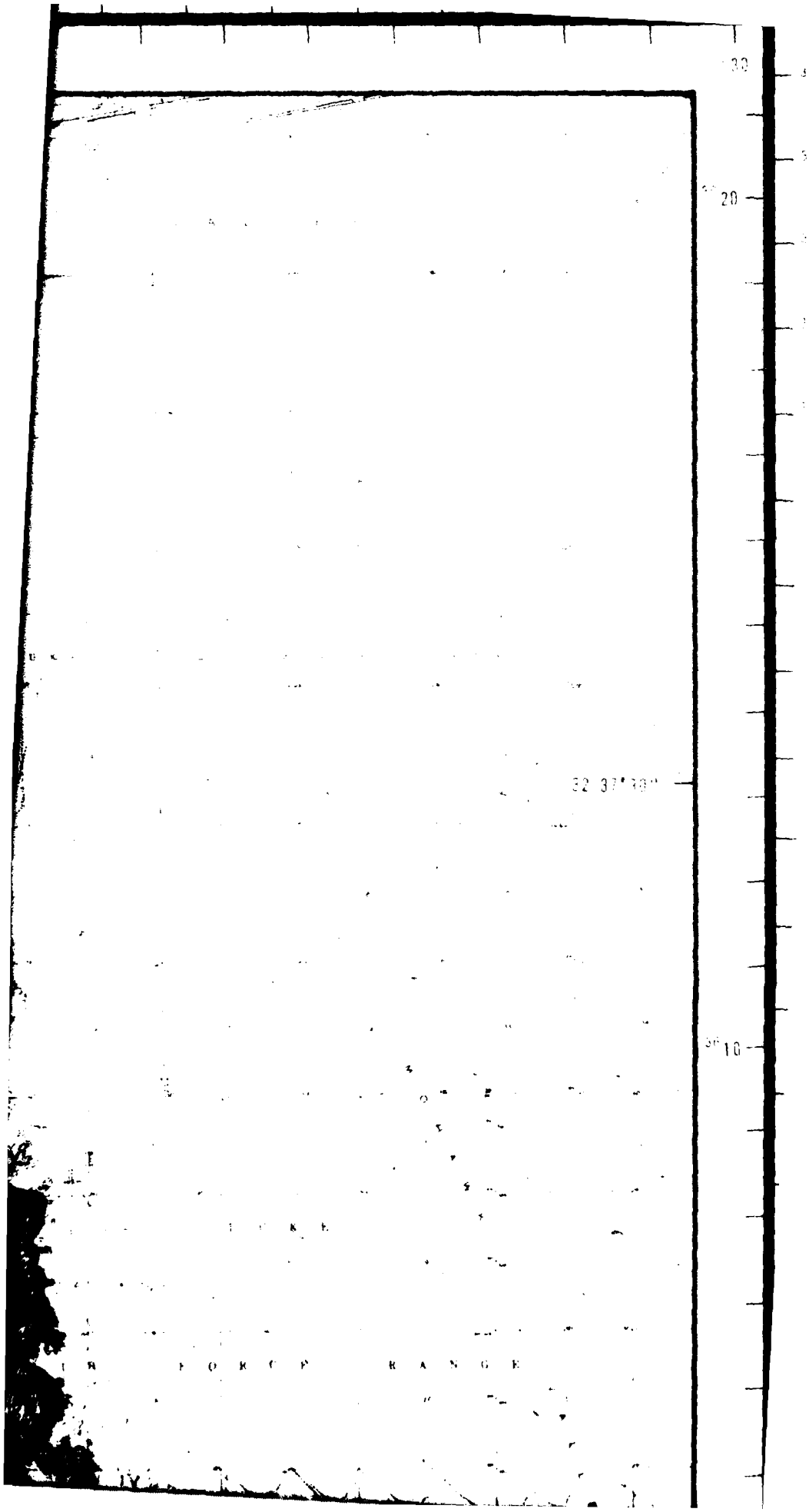
DRAWING
3.5-A

FUGRO NATIONAL, INC.


114°15'
DOME
VALLEY
A5ec
A5ec
A5ec


A1/A5y
A5if
A1/A5y
A5yf(A5if)
A5if
A5yf
A1/
A5yf
A5if
A5iyc
A5i
A5if
A5if
A5if
A5if
A5yf
A5ioc
A5iyf
A5iyf
A5yf(A5if)
A5iyf
A5iy
A5i
A5if
A5iyf
A1
A1/A5yf
A5yf
A5yf(A5if)
A1/A5yf
A5iyf
A5yf
A5iy
A5yf
A5if
A5ic
A5iy
A5iyf
A5iy
A5iyf
(A5if)
A5yf


A5if
A5yf
A5if
A5if
A5yf (A5if)
A5yf
A5if
A5if
A5if
A5yf
A5if
A5yf (A5if)
A5yf
A5if
A5if
A5yf
A5if
A5if
A5if


30
20
10
32 37' 30"
FORCE RANGE

EXPLANATION

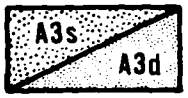
SURFICIAL BASIN-FILL UNITS



Stream Channel Deposits (A1); Loose to medium dense, moderately to well sorted sand with minor amounts of silt- and gravel-sized material; deposits become finer grained in the downstream direction.

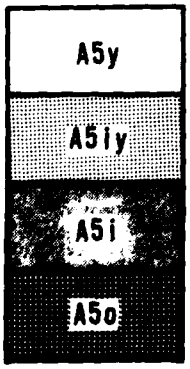


Terrace Deposits (A2); Medium dense to dense, well sorted silt and clay with lenses of sand and gravel.



Eolian Sand Deposits (A3); Loose to medium dense, well sorted, fine to medium grained sand to silty sand deposited as thin sheets (A3s) or dunes (A3d).

Alluvial Fan Deposits (A5); Loose to dense, poorly sorted sand and gravel with varying amounts of silt, cobble, and boulder-sized material. Deposits become finer grained with distance from the source area (proximal to distal end); relative age is indicated by lower case letters.



A5y, A5yf – younger, weak to no cementation, no to poor pavement and no patina

A5iy, A5iyf, A5iyc – intermediate-younger, weak to no cementation, no to well developed pavement and patina

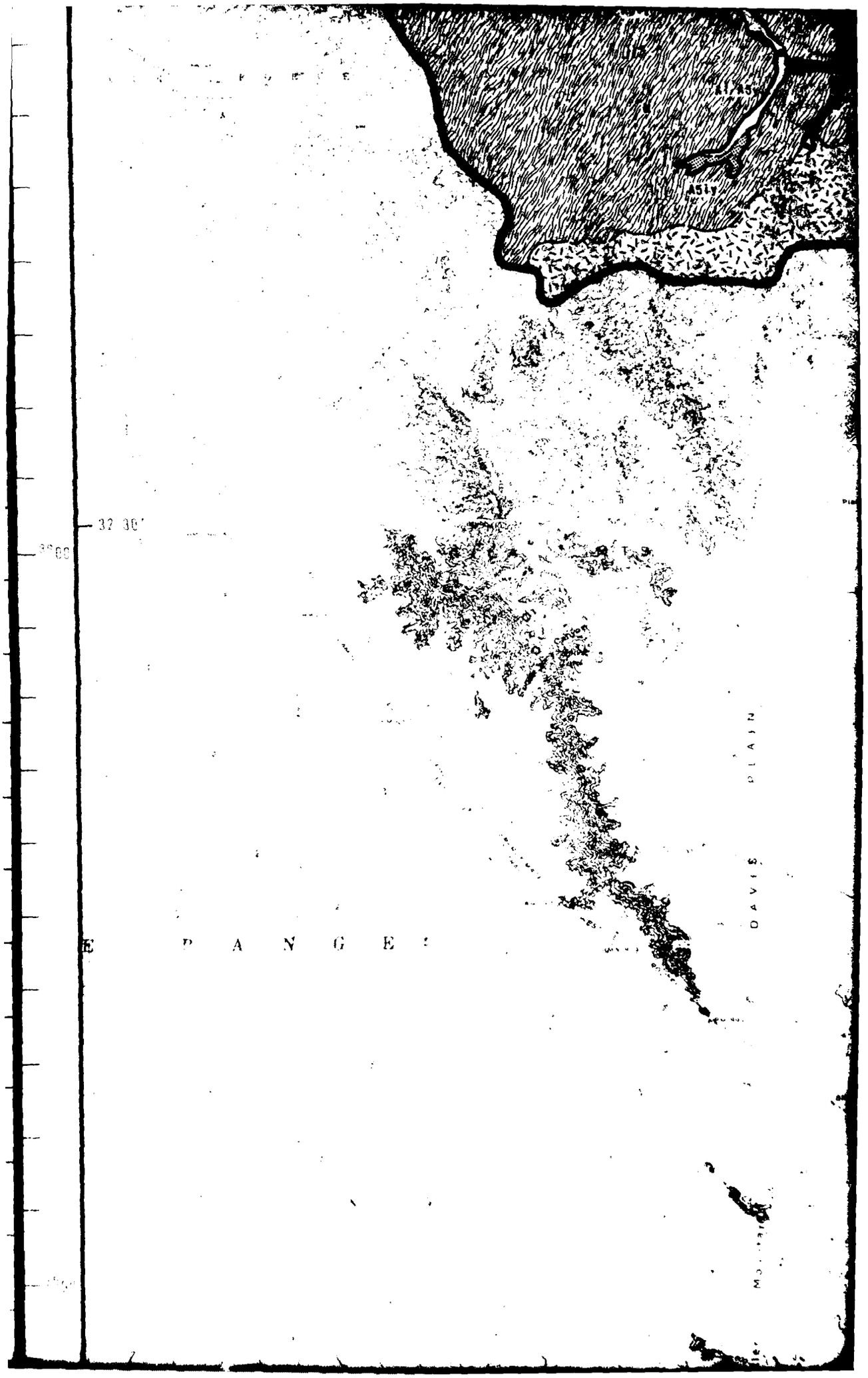
A5i, A5if, A5ic – intermediate, weak to strong cementation, poor to well developed pavement, no to well developed patina.

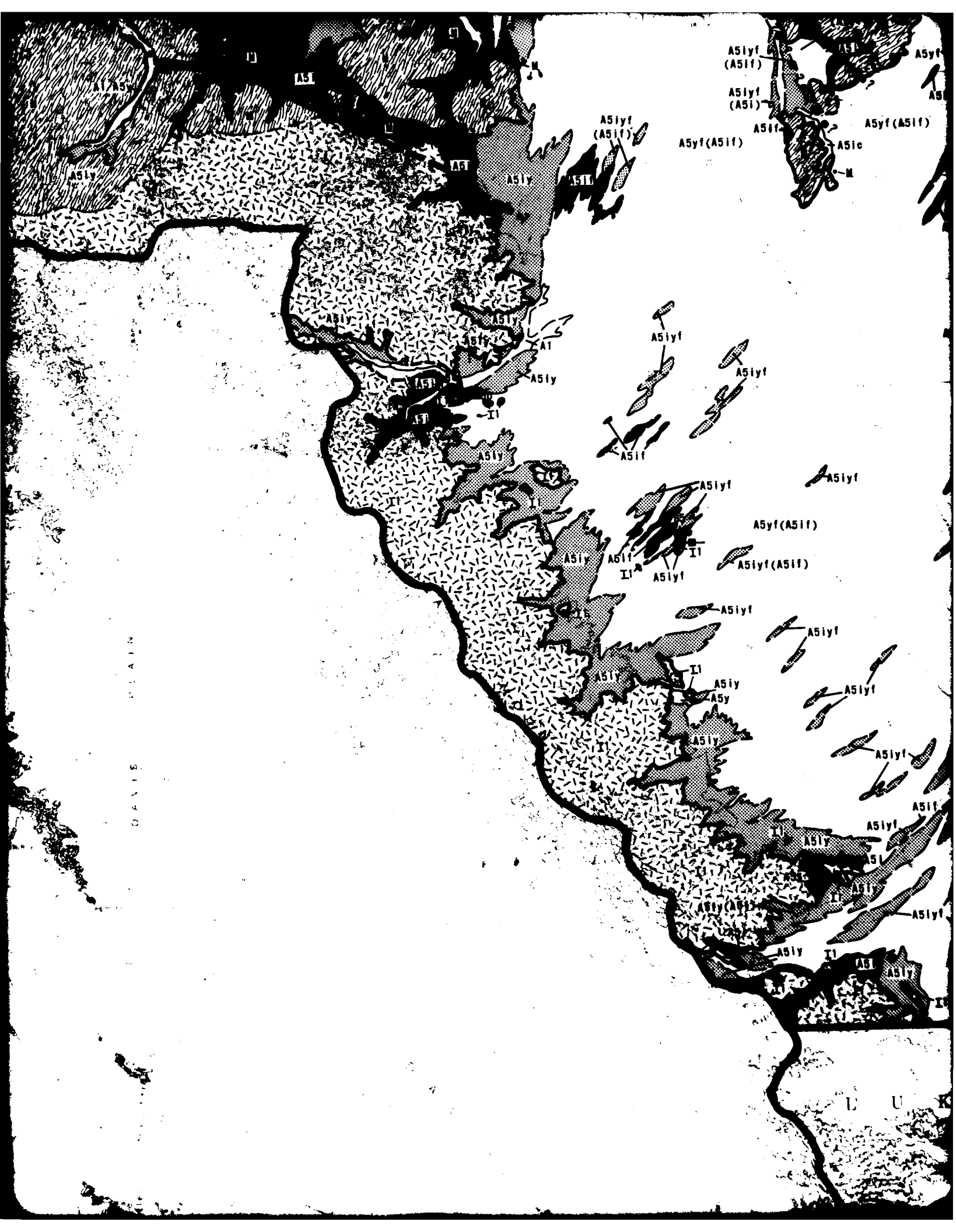
A5oc – older, moderate to strong cementation, poor to well developed pavement, no to well developed patina.

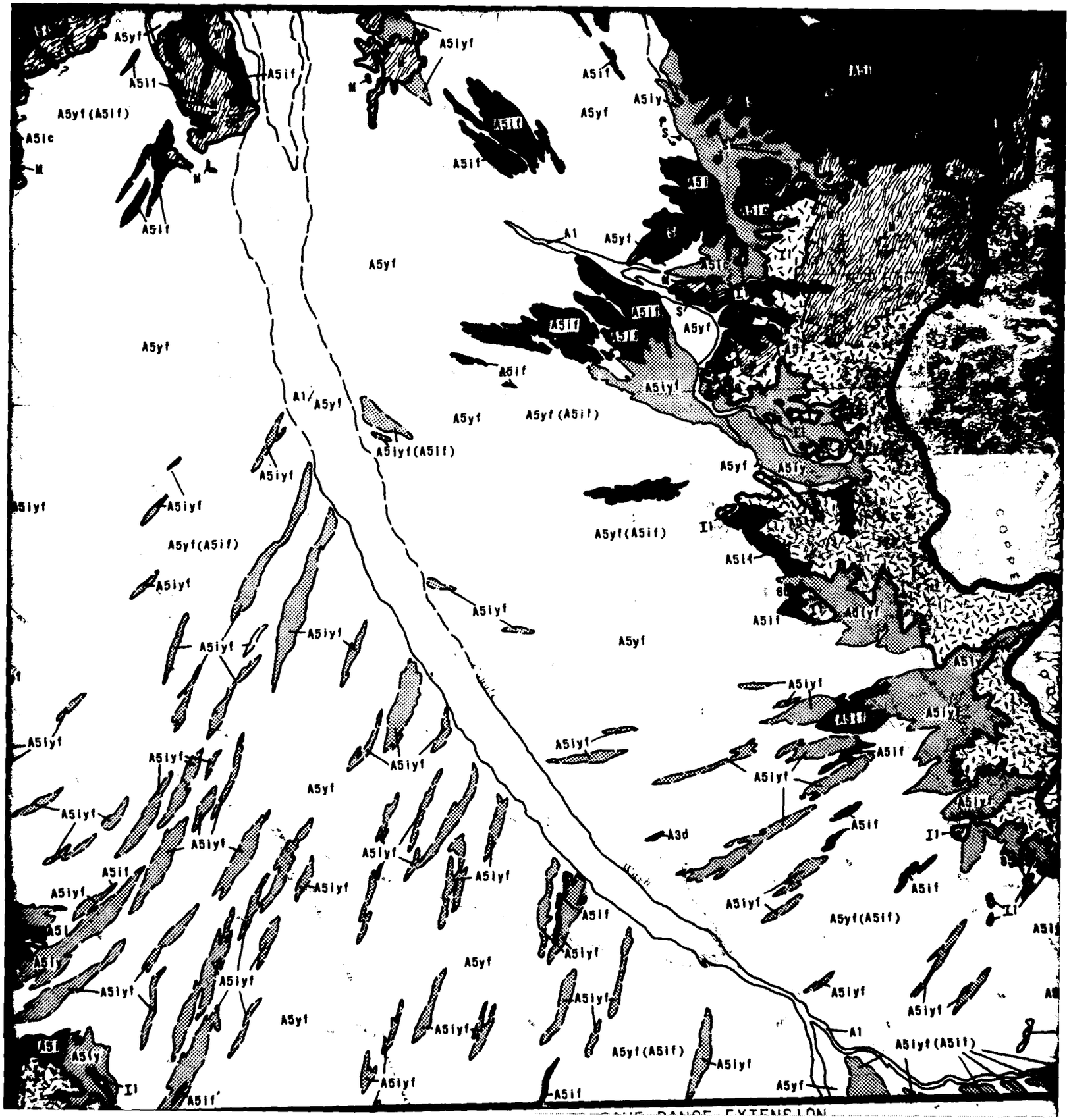
Modifying letter (f) designates predominantly finer-grained (less than 3 inches; 76mm) material; (c) designates predominantly coarser-grained material. Absence of a modifying grain-size letter indicates a gradation from coarser to finer-grained within the fan segment or data were insufficient to differentiate.

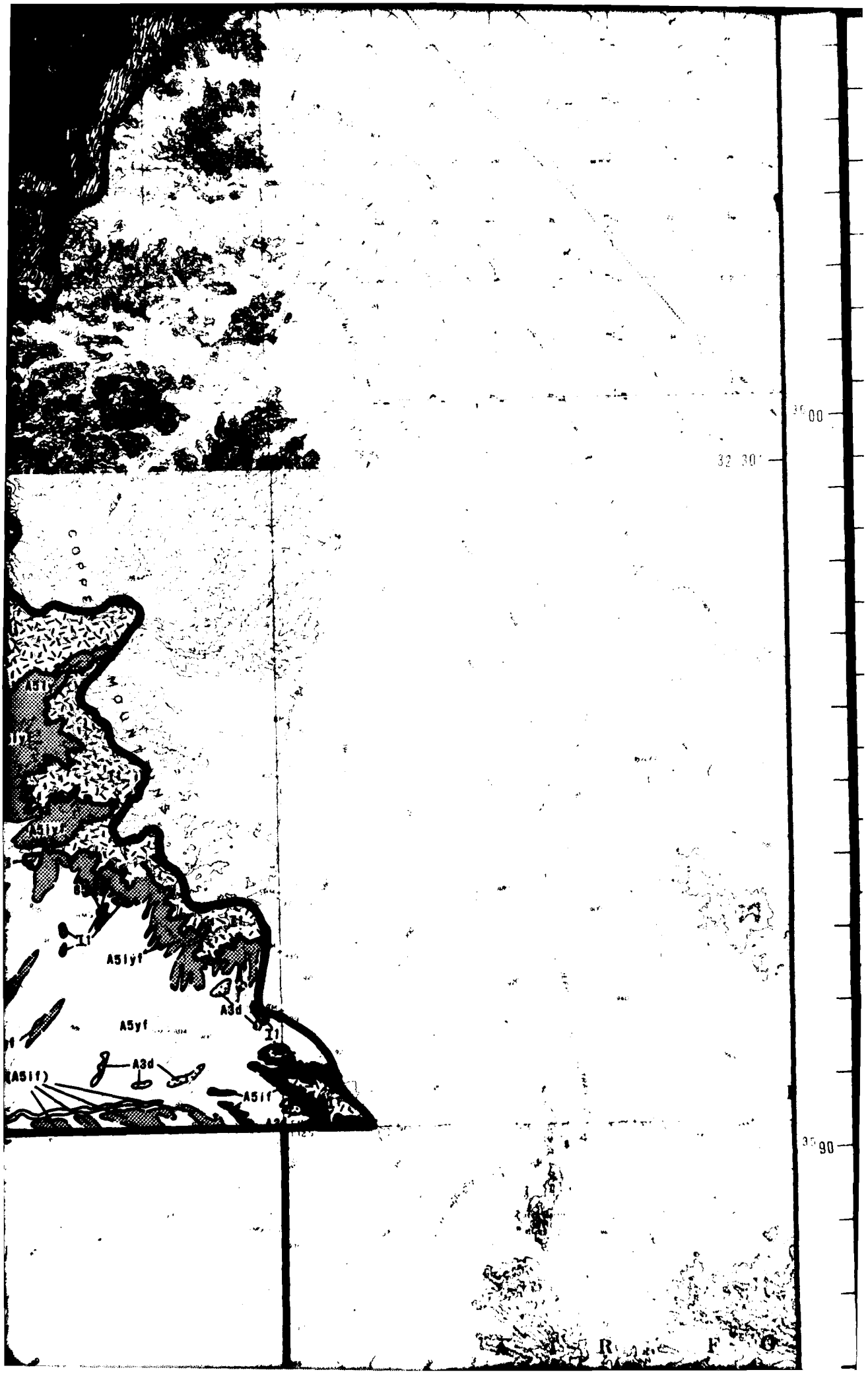
A3s/A5yf – Mixed surficial basin-fill units.

A5yf(A5i) – Parenthetic unit underlies mapped unit at depths of 0 to 5 feet (0 to


A1A5
A51y
32 30'
E P A N G E
DAVIS PLAIN


A5iyf
(A5if)
A5iyf
(A5i)
A5yf(A5if)
A5if
A5ic
A5iyf
(A5if)
A5yf(A5if)
A5iy
A5iy
A5iy
A5if
A1
A5iy
A5iyf
A5iyf
A5if
A5iy
I1
A5iyf
A5iyf
A5yf(A5if)
A5if
I1
A5iyf
A5iyf(A5if)
A5iy
I1
A5iyf
A5iyf
A5iy
I1
A5iy
A5y
A5iyf
A5iy
A5iyf
A5if
A5iyf
A5iy
A5iy(A5i)
A5iyf
A5iy
I1
A5iy
A5if
A5iyf
I1


A5yf
A5iyf
A5if
A5yf(A5if)
A5ic
A1
A5yf
A5iyf(A5if)
A5yf(A5if)
A3d
A5if
A5iyf
A5yf
A5if
A5iyf
A5yf
A5iyf
A5yf
A5iyf
A5yf


35°00
32°30'
35°90
A5yf
A3d
A5yf
A3d
A5yf
A5yf
A5yf

Modifying letter (f) designates predominantly finer-grained (less than 3 inc 76mm) material; (c) designates predominantly coarser grained material. Absenc of a modifying grain-size letter indicates a gradation from coarser to finer- grained within the fan segment or data were insufficient to differentiate.

A3s/A5yf - Mixed surficial basin-fill units.

A5yf(A5i) - Parenthetic unit underlies mapped unit at depths of 0 to 5 feet (0 t 1.5m).

ROCK UNITS

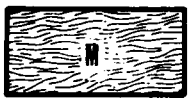


Sedimentary (S); Predominantly arkosic sandstone and granite-gneiss boulder conglom (massively to indistinctly bedded); cobble and boulder clasts in conglomerate are pr dominantly quartz monzonite, schist, and gneiss.



Igneous; Intrusive (I1); predominantly fine to coarse grained quartz monzonite.

Igneous; Extrusive (I2); predominantly basalt.



Metamorphic (M); Metamorphic complexes of gneiss and schist; mineral compositions of quartz, feldspar, biotite, muscovite, amphibole, and epidote.

SYMBOLS

GEOLOGIC CONTACT; Rock/basin fill where line is solid, rock and colluvium/basin fill where line is dashed. (Colluvium cannot be illustrated at presentation scale d to limited extent).

GEOLOGIC CONTACT; Within rock or basin-fill units; dashed where approximately locate

FAULT; Approximately located, dotted where concealed by surficial deposits, queried where existence uncertain.

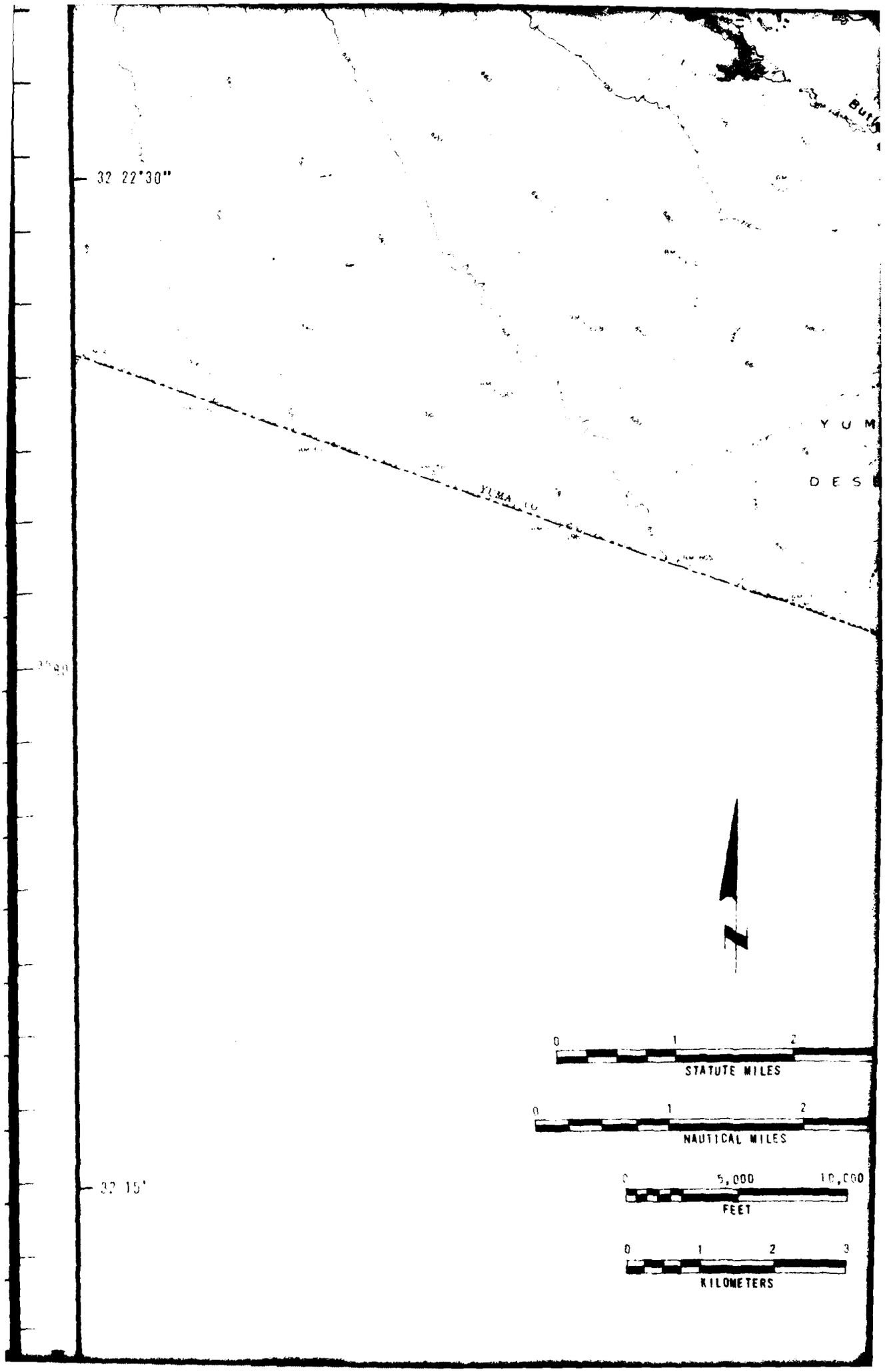
STRIKE AND DIP OF BEDDING

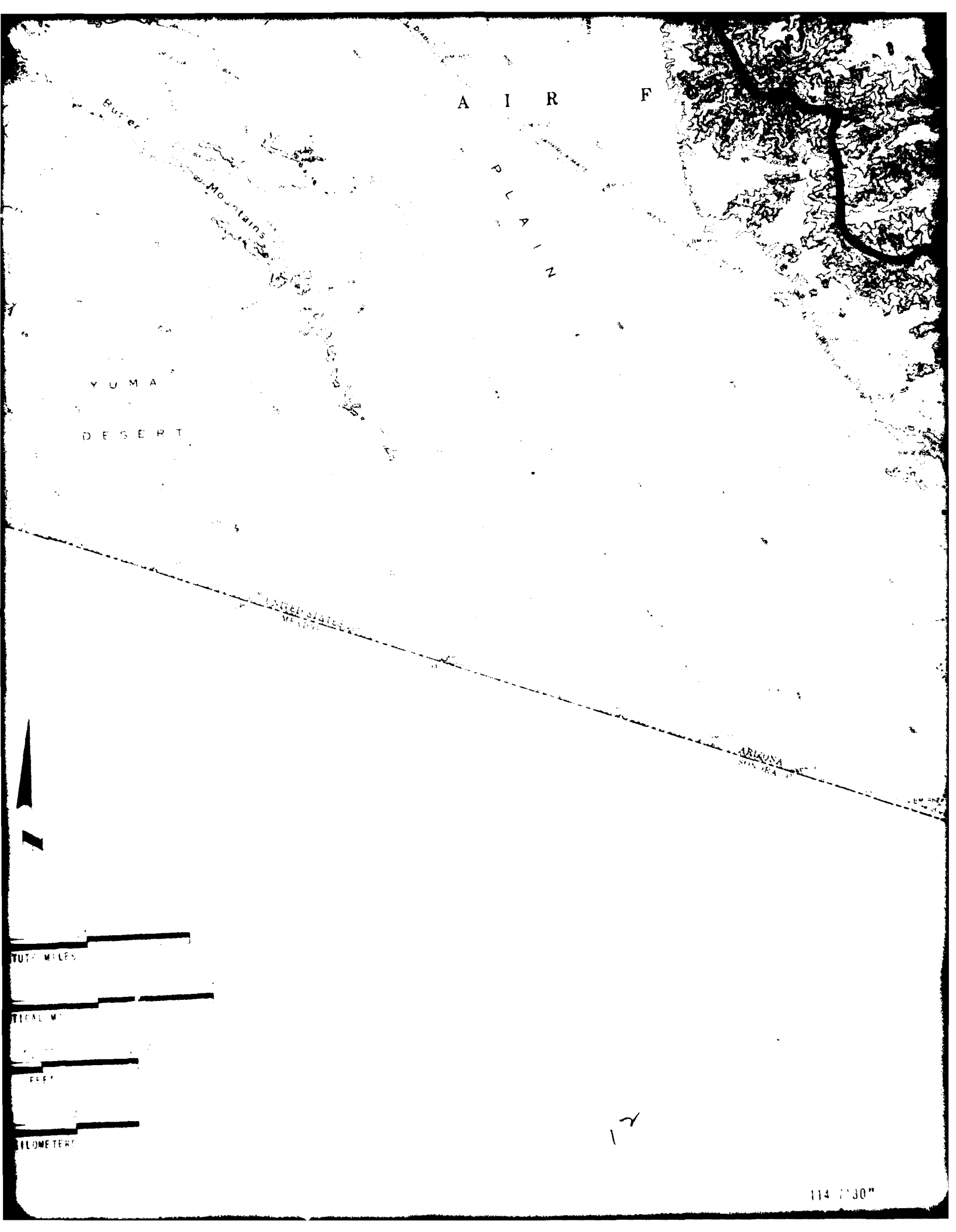
STRIKE AND DIP OF FOLIATION

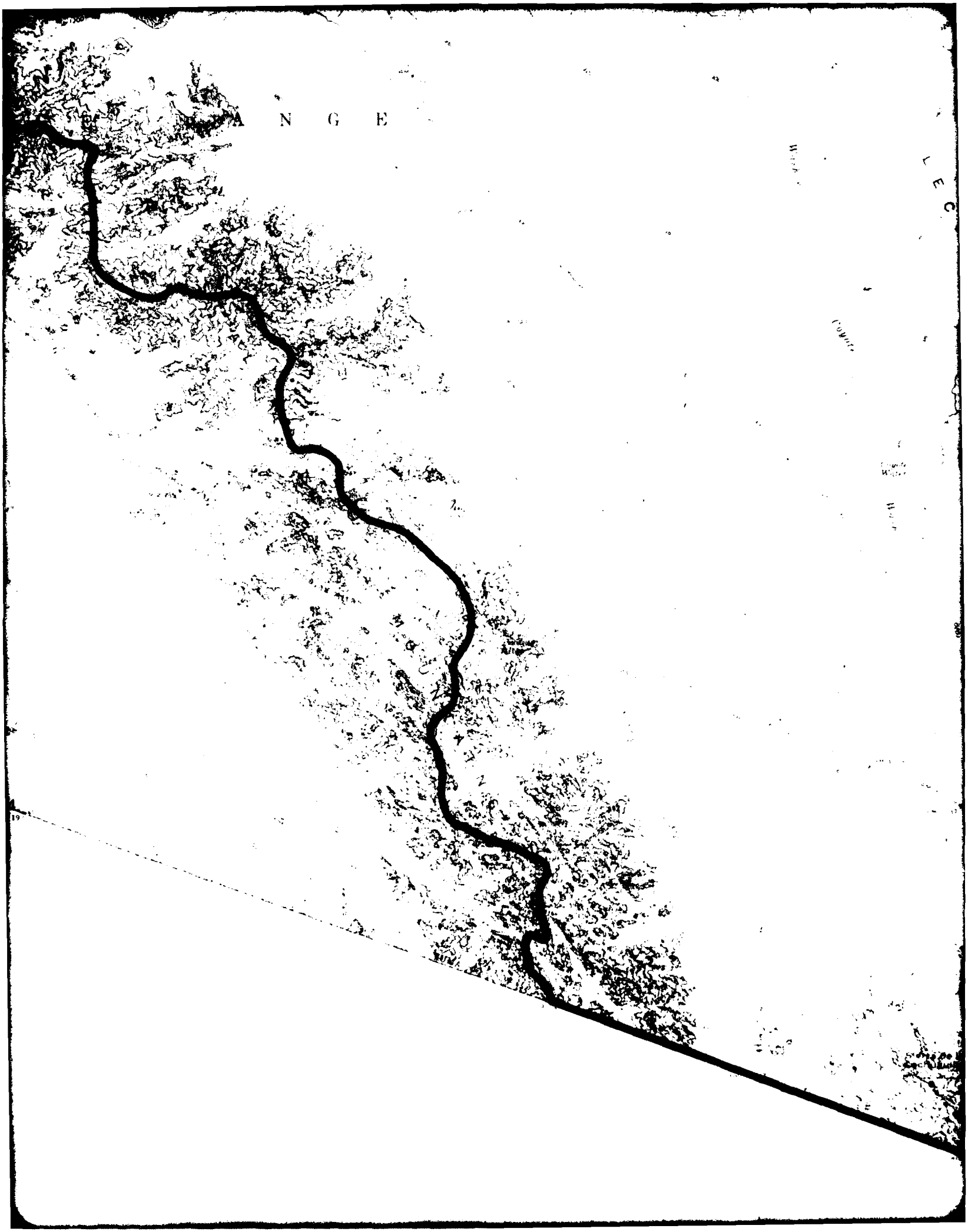
STRIKE OF VERTICAL FOLIATION

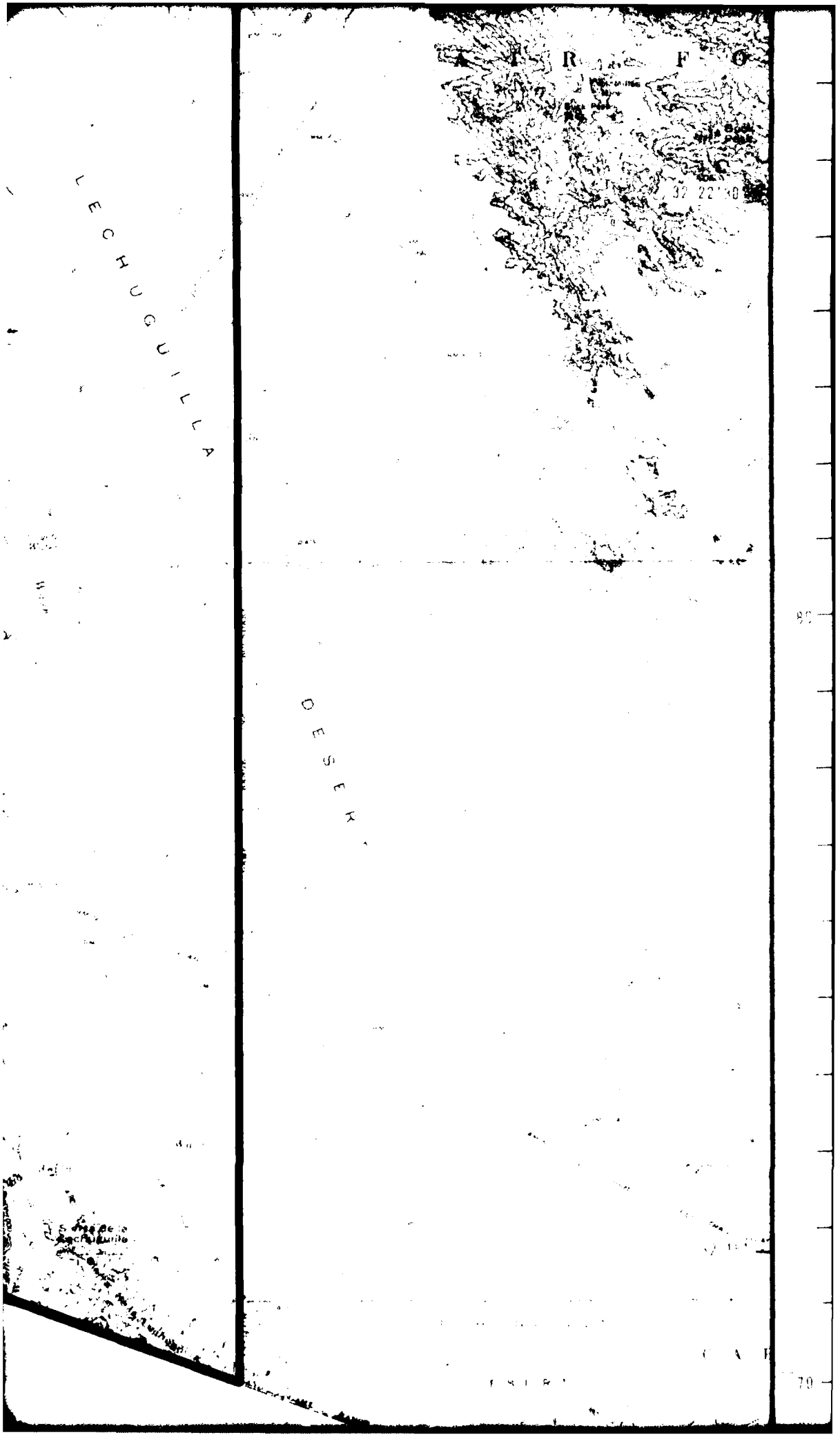
STRIKE AND DIP OF MAJOR JOINTS

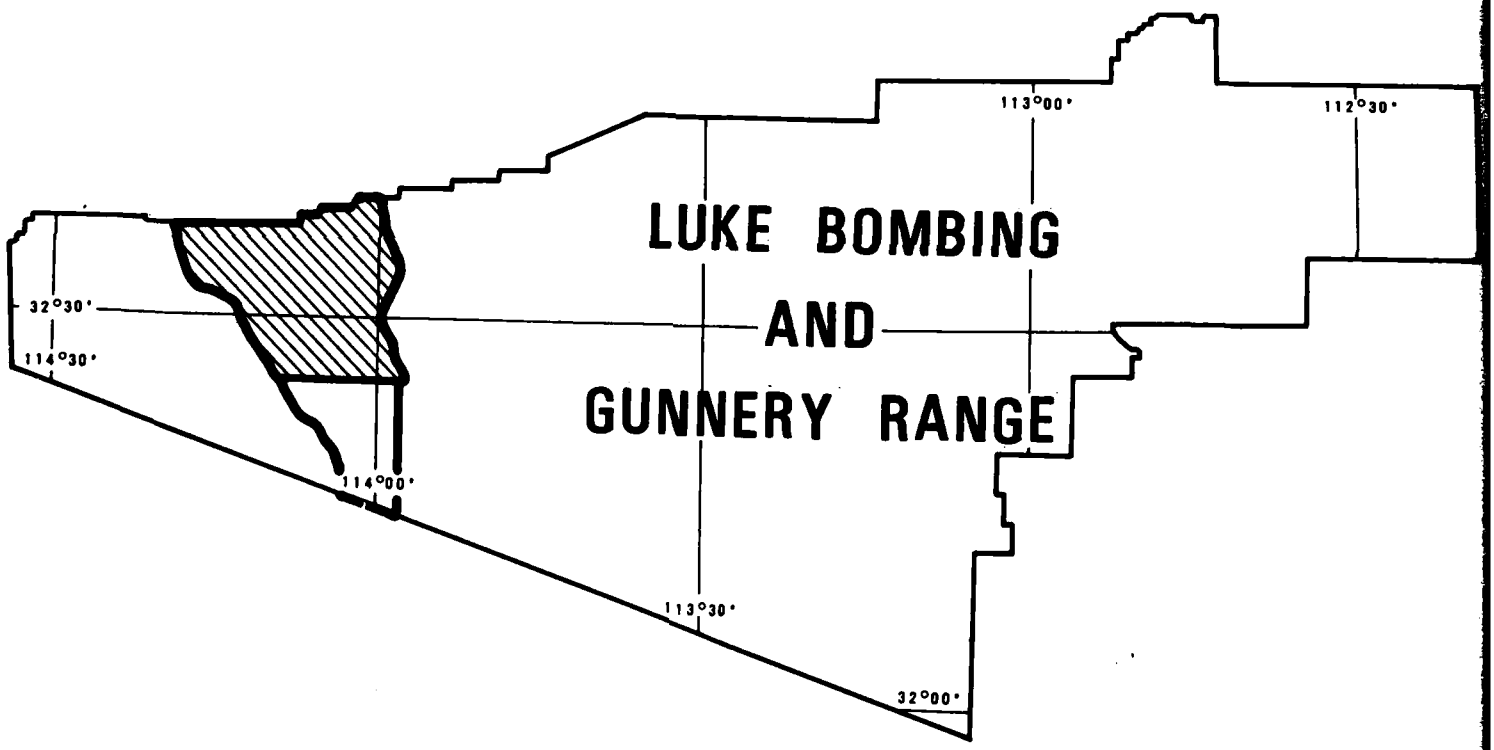
STRIKE OF VERTICAL JOINTS

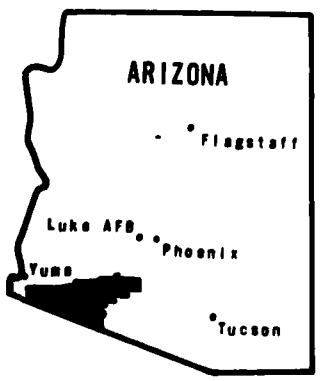

32 22'30"
YUM
DES
32 15'
0 1 2
STATUTE MILES
0 1 2
NAUTICAL MILES
0 5,000 10,000
FEET
0 1 2 3
KILOMETERS

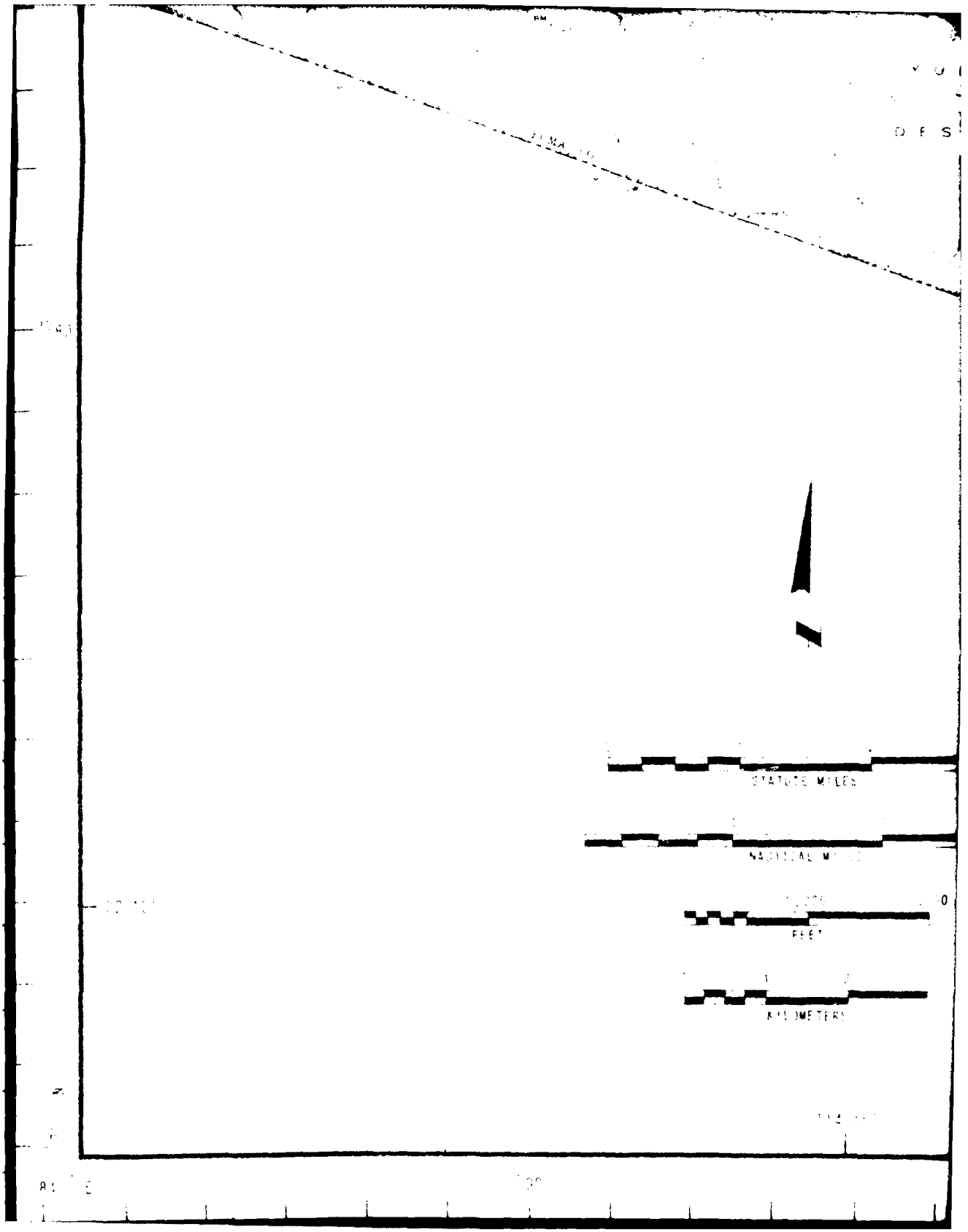

A I R F
P L A I N
Mountains
YUMA
DESERT
ARIZONA
114 7'30"

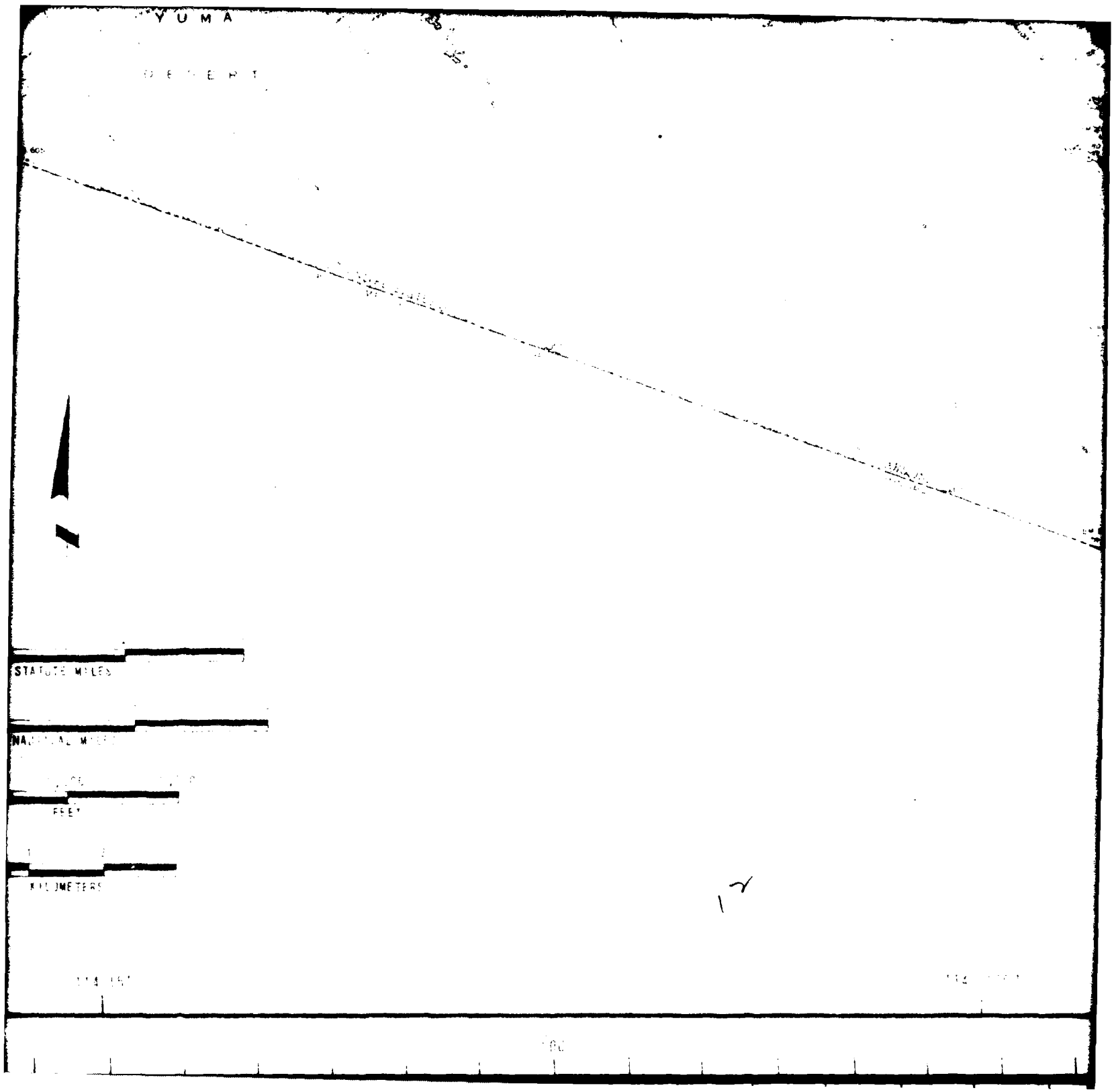

A N G E

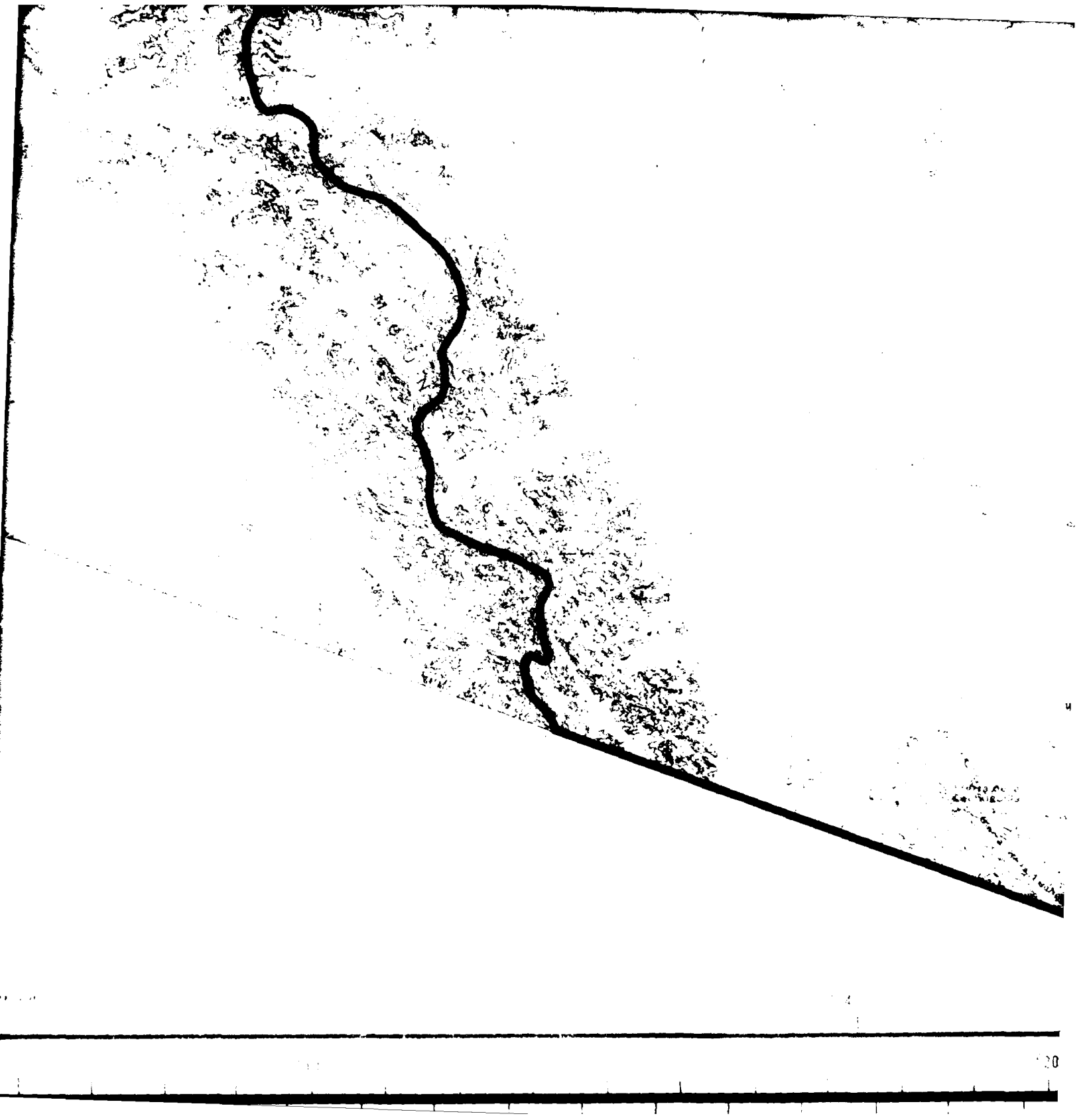

LECHUGUILLA
OESTE

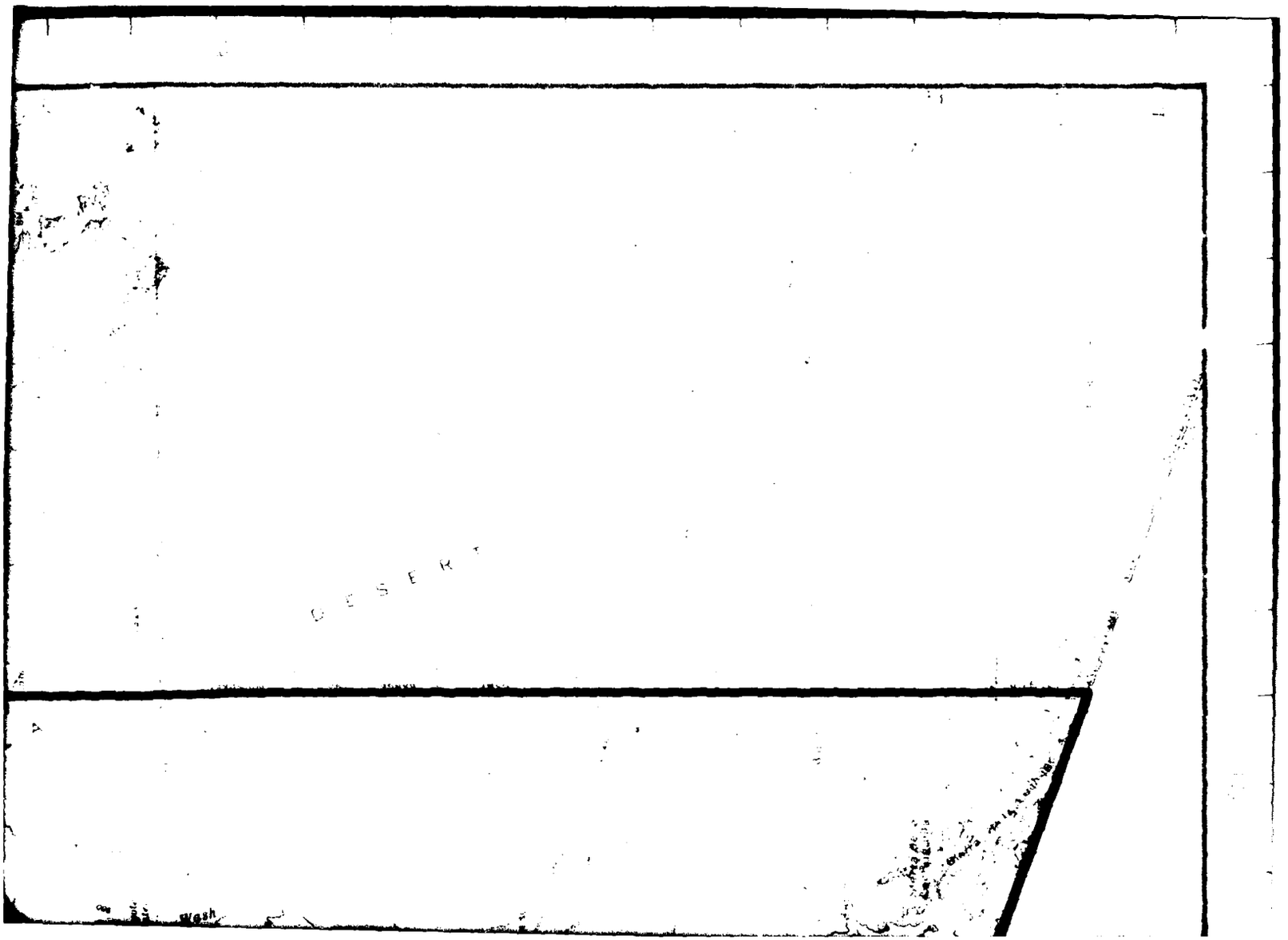

LUKE BOMBING
AND
GUNNERY RANGE
113°00'
112°30'
32°30'
114°30'
114°00'
113°30'
32°00'


ARIZONA
Flagstaff
Luke AFB
Phoenix
Yuma
Tucson

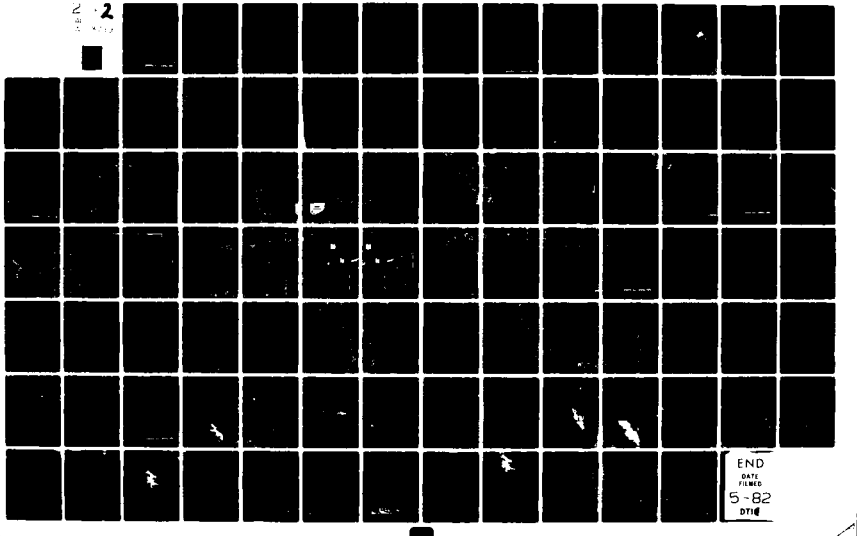

STATUTE MILES
NAUTICAL MILES
FEET
KILOMETERS


YUMA
STATUTE MILES
FEET
KILOMETERS




DESERT
wash

AD-A113 219 FUGRO NATIONAL INC LONG BEACH CA F/G 8/7
MX SITING INVESTIGATION. GEOTECHNICAL SITING STATUS REPORT. VOL--ETC(U)
JUN 78
UNCLASSIFIED FN-78-JUN-II-VOL-2 NL

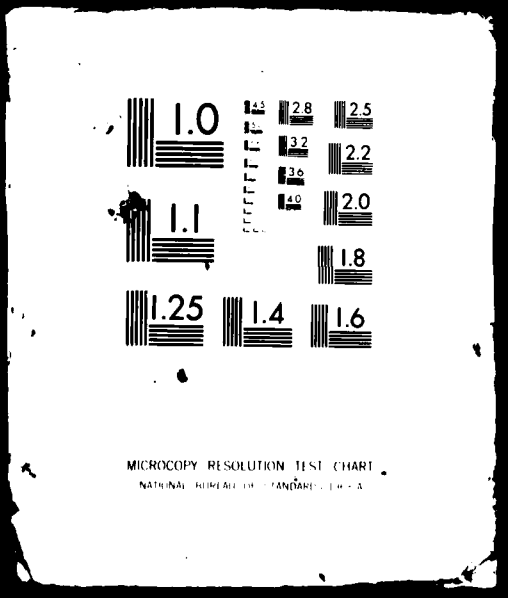


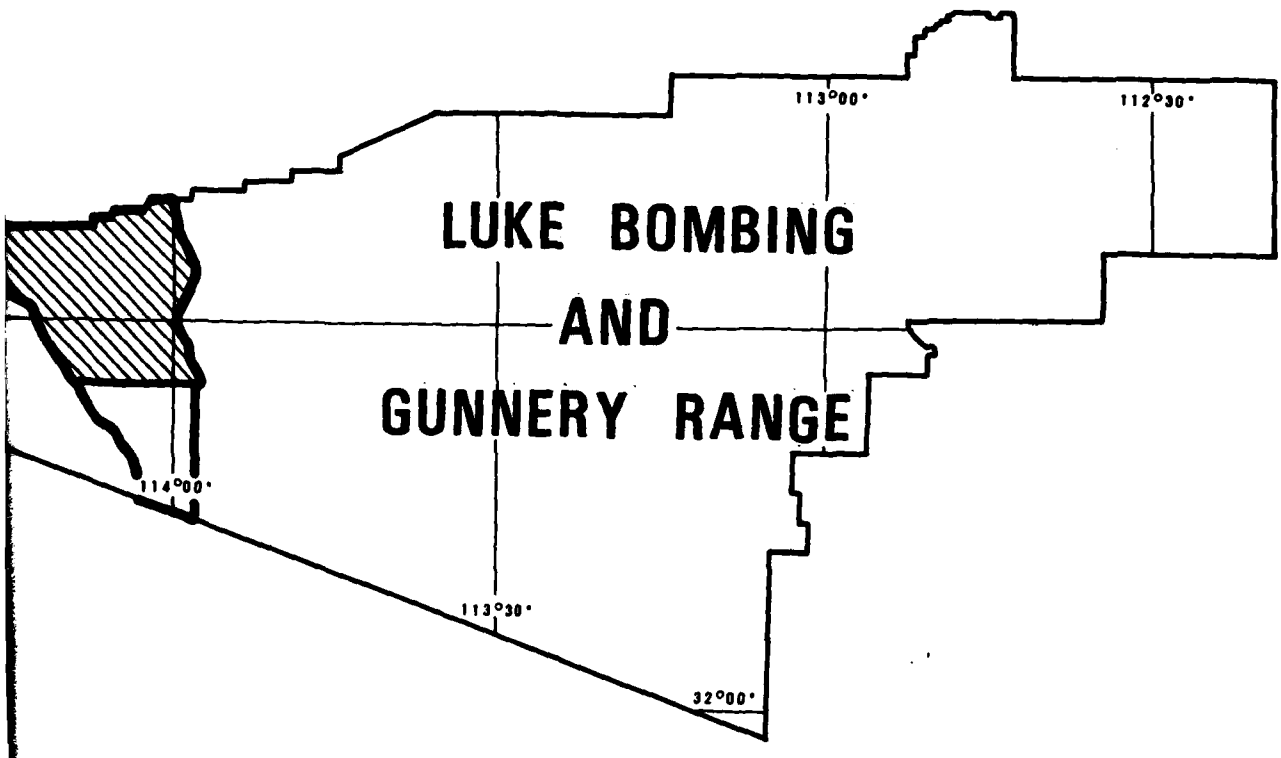
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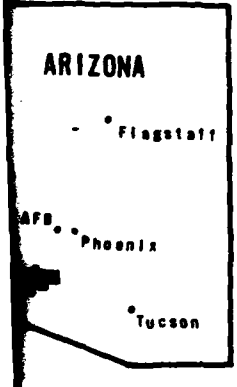
2 OF 2

AD-

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15

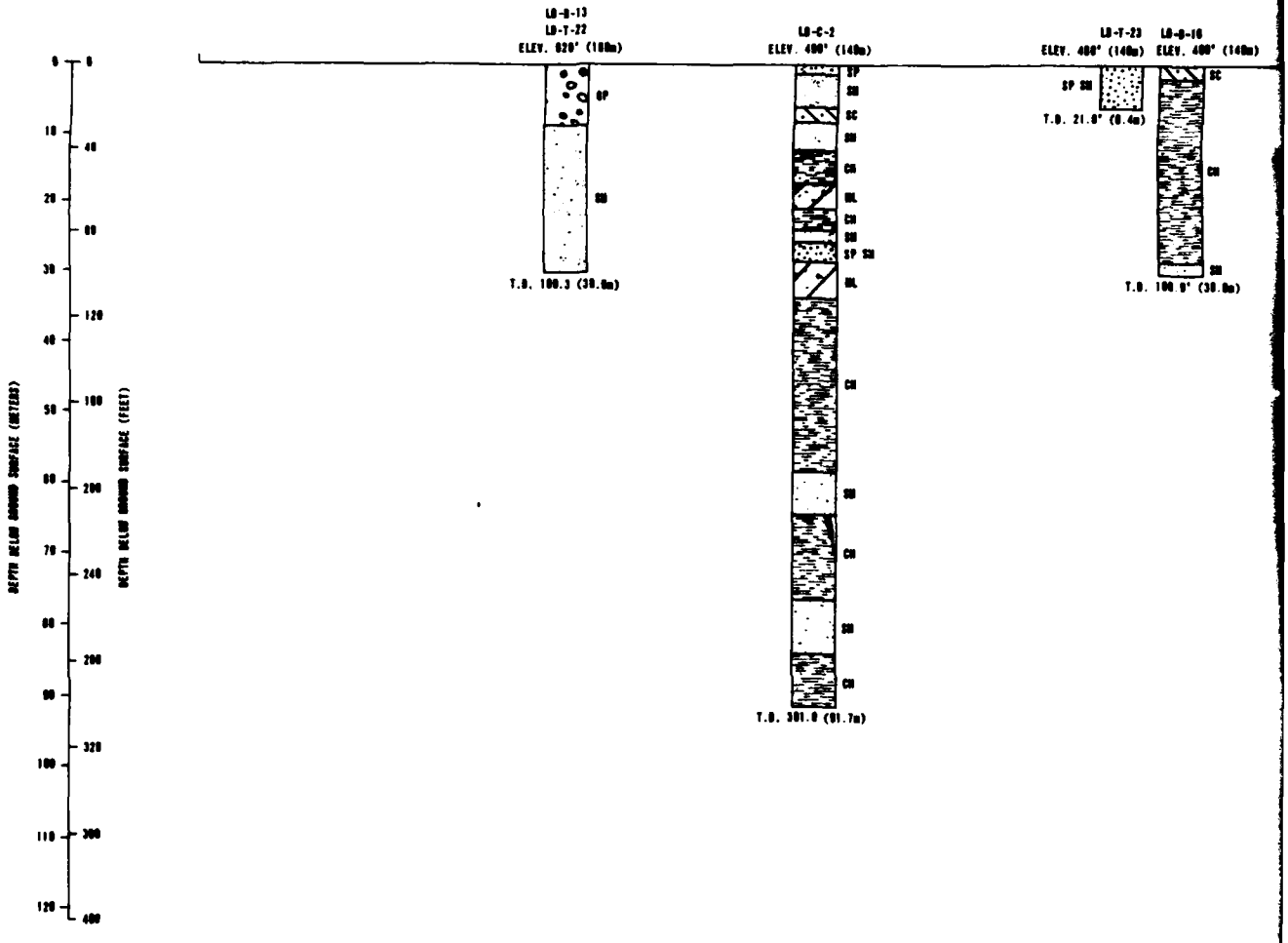
GEOLOGIC MAP
LECHUGUILLA DESERT, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

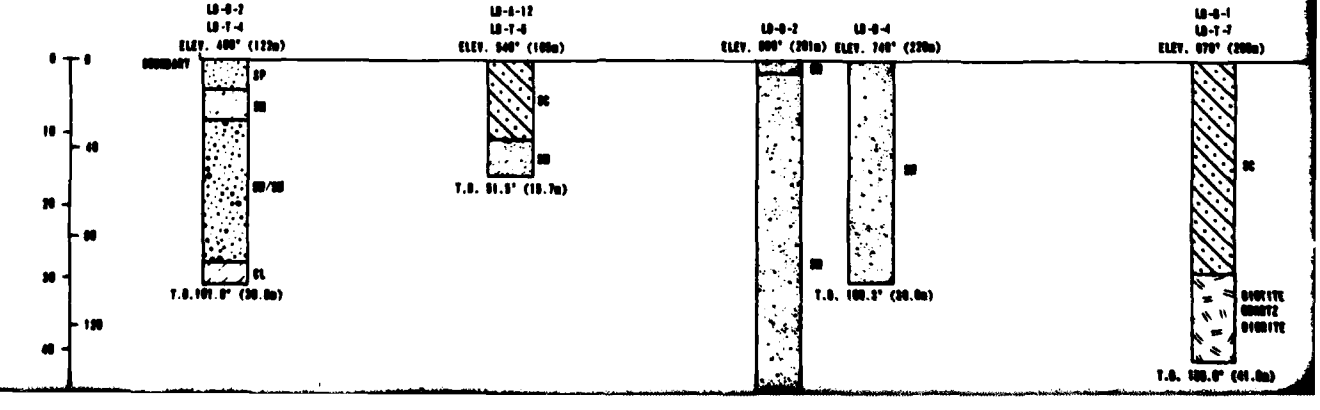
DRAWING
3.5-B

FUGRO NATIONAL INC

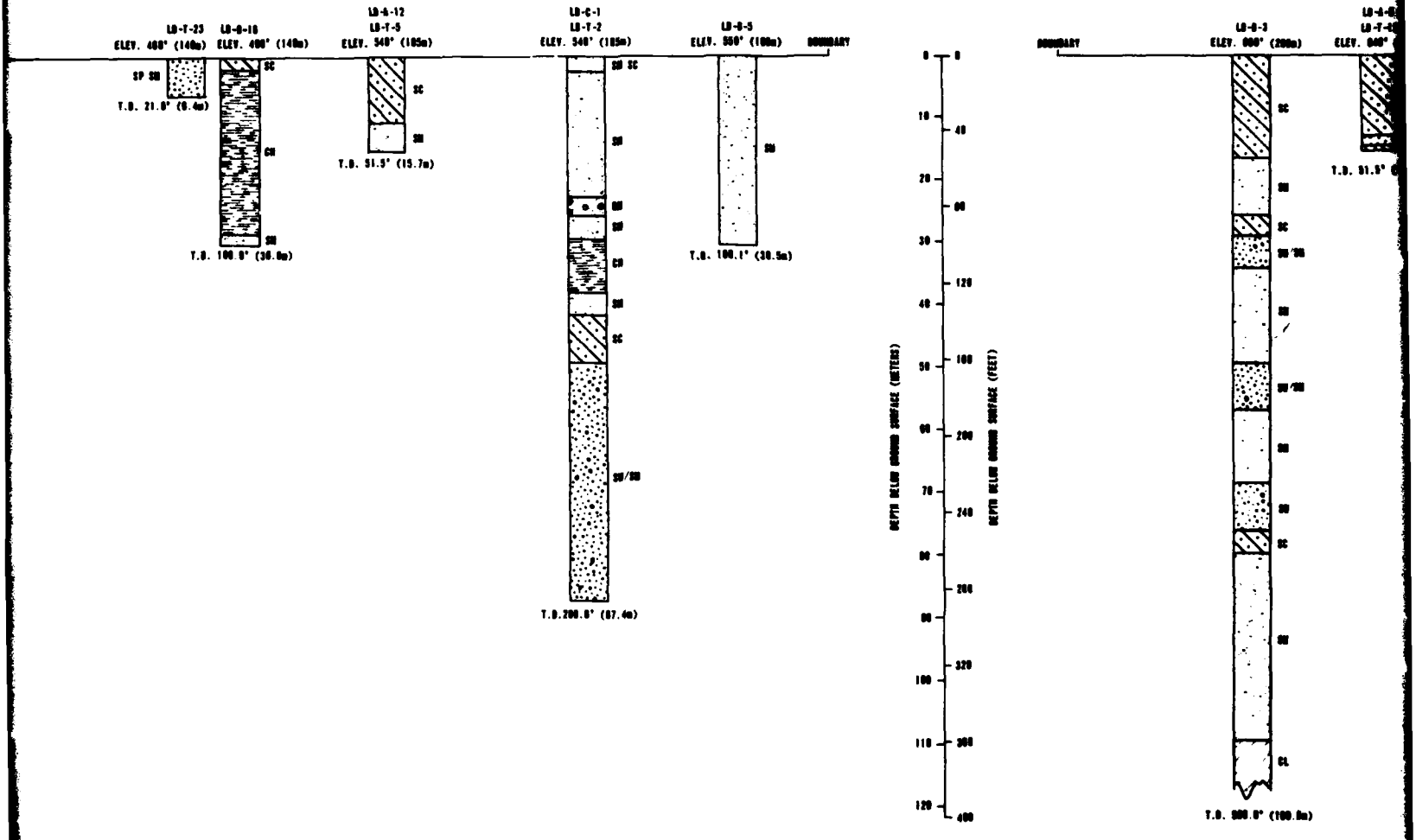
SOIL PROFILE LD-SP-AA'



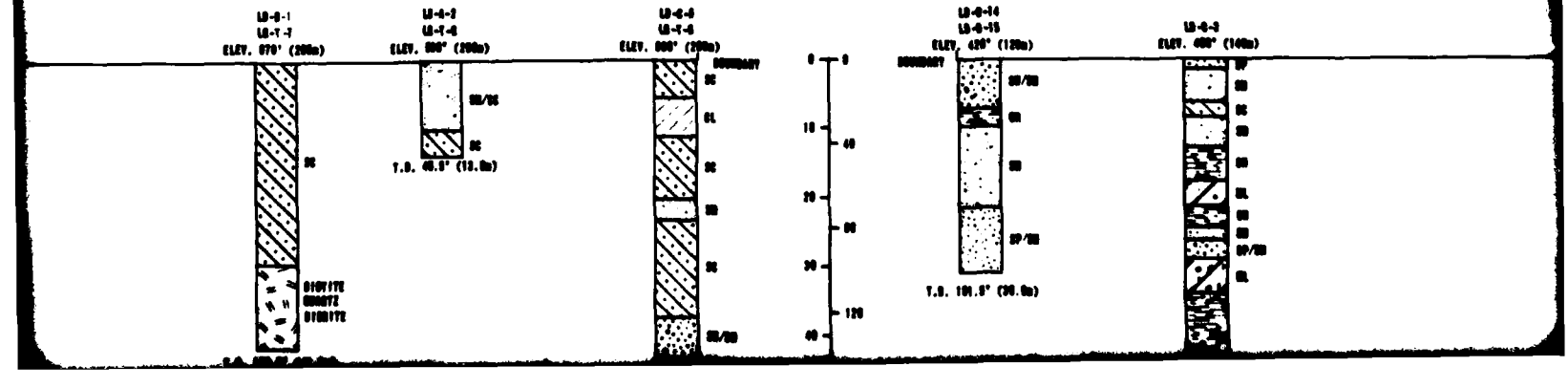
SOIL PROFILE LD-SP-CC'



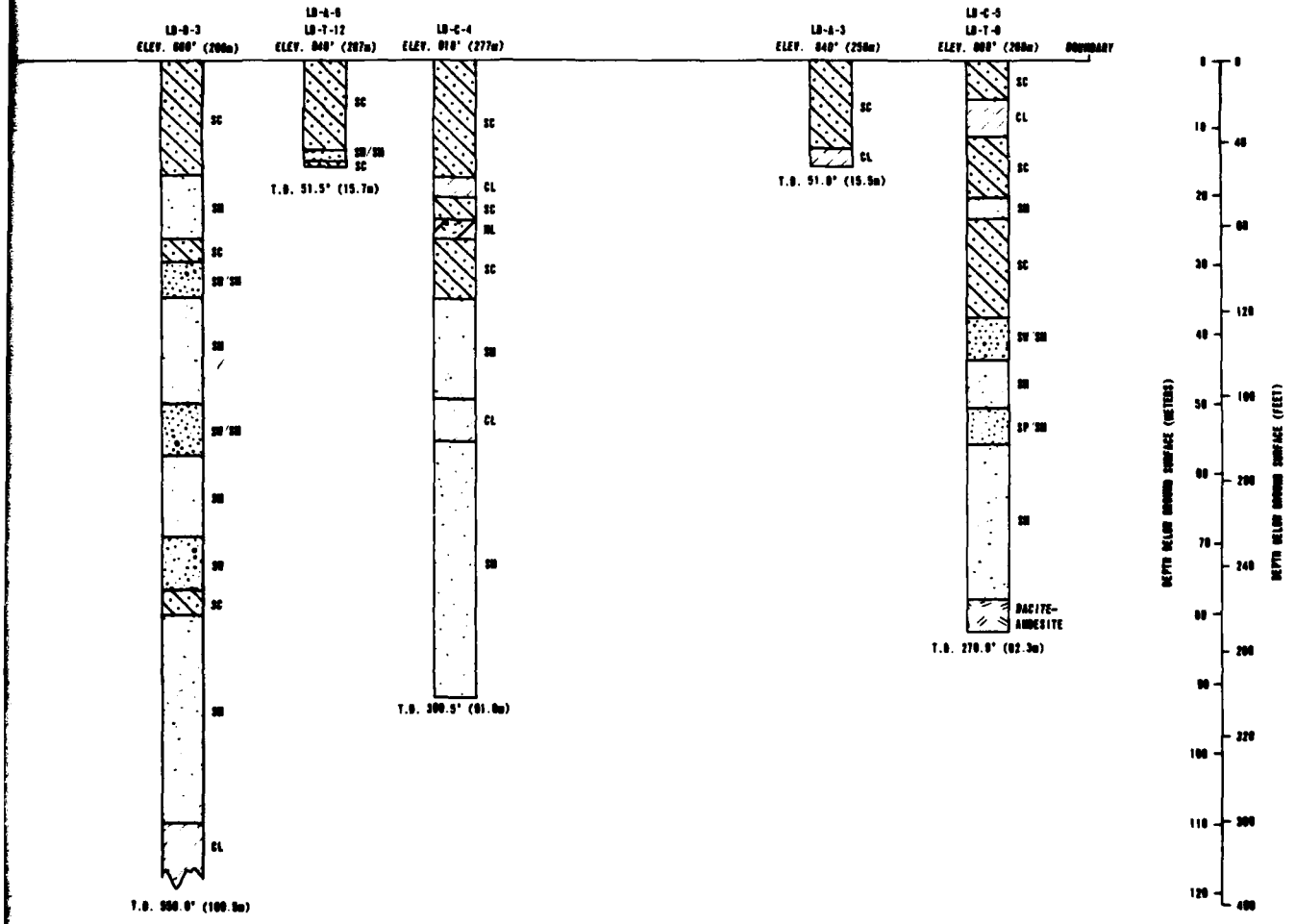
PROFILE LD-SP-AA'



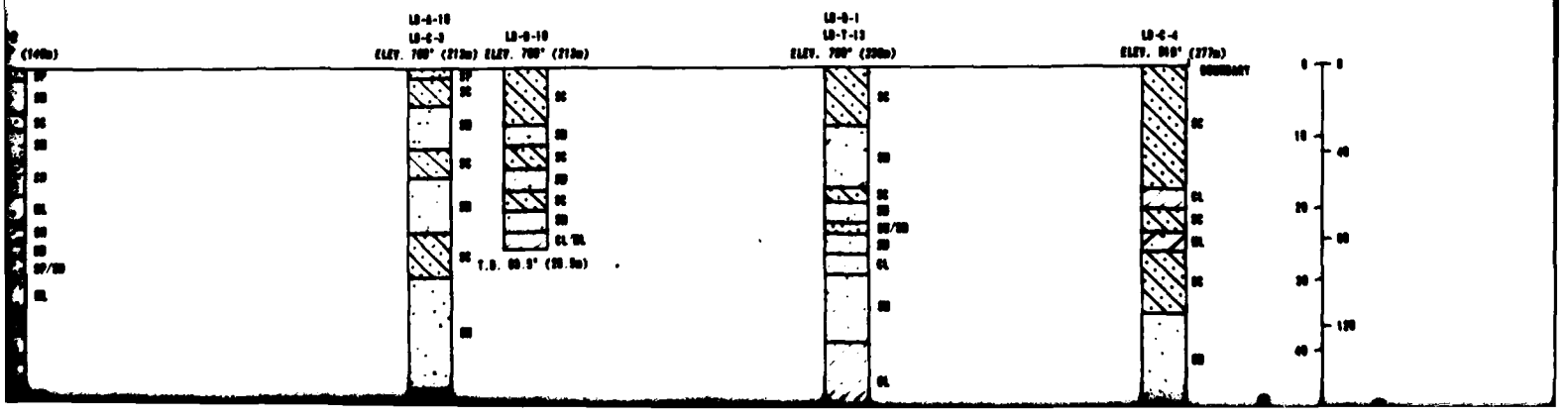
LD-SP-CC'

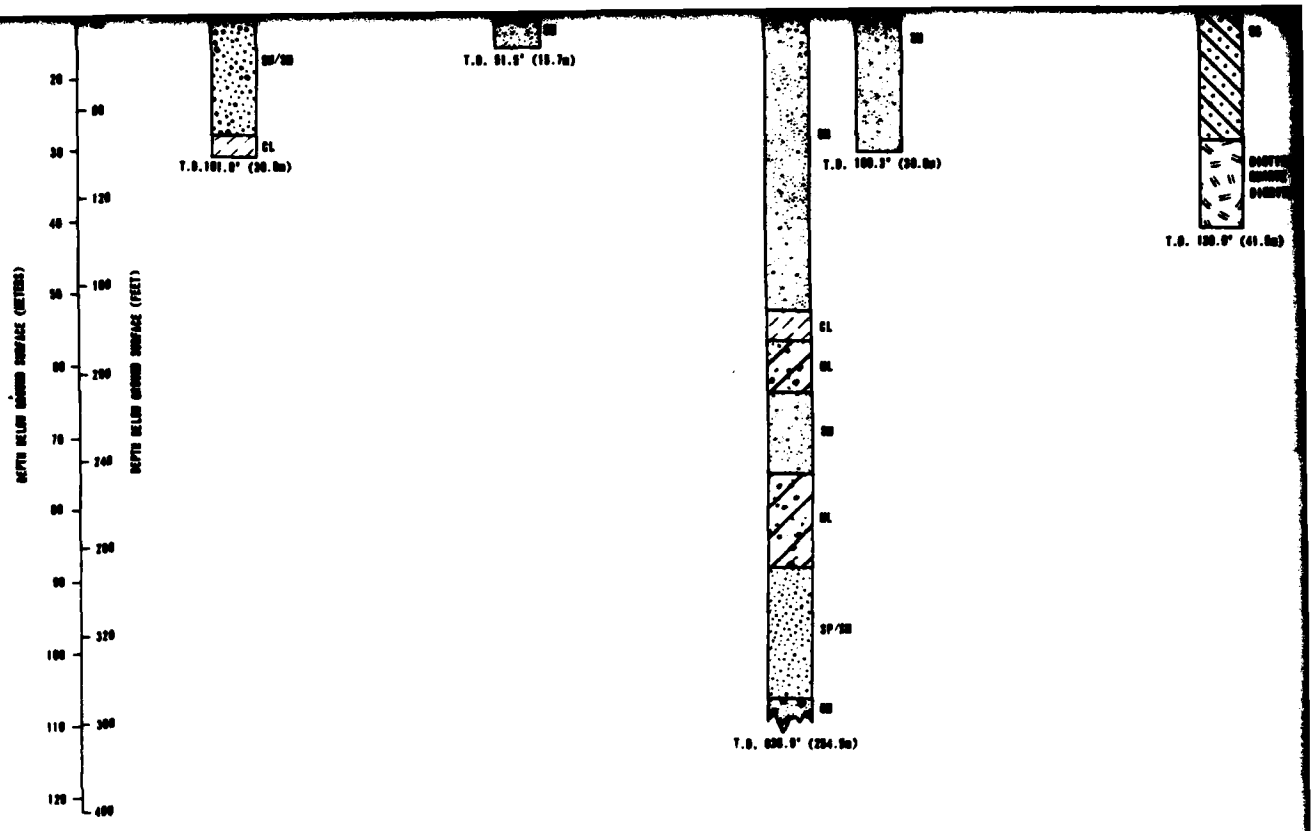


SOIL PROFILE LD-SP-BB'

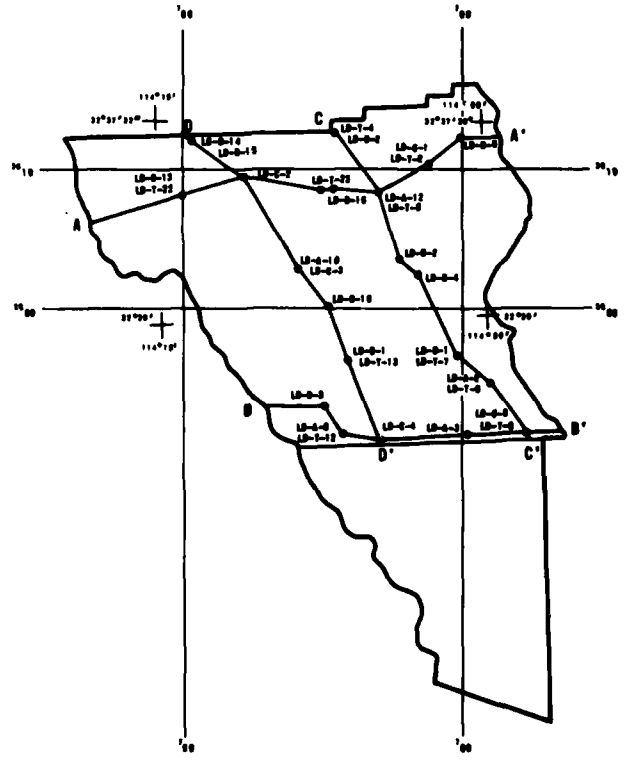


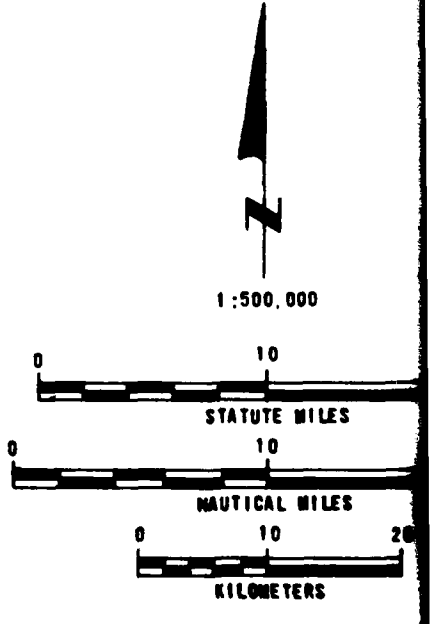
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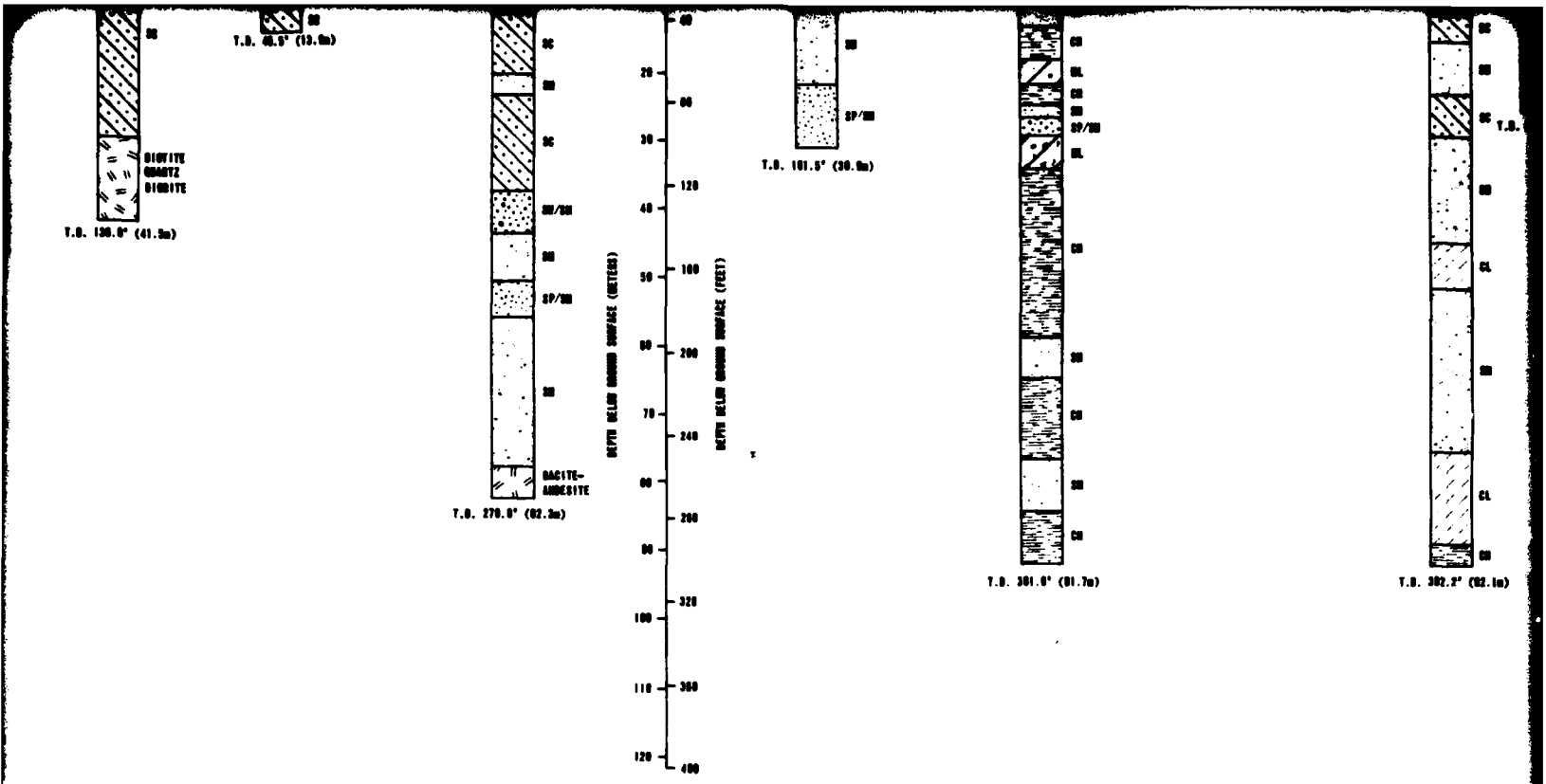




LOCATION MAP







HORIZONTAL

STATUTE MILES 0 2

KILOMETERS 0 2

N

:500,000

10 20

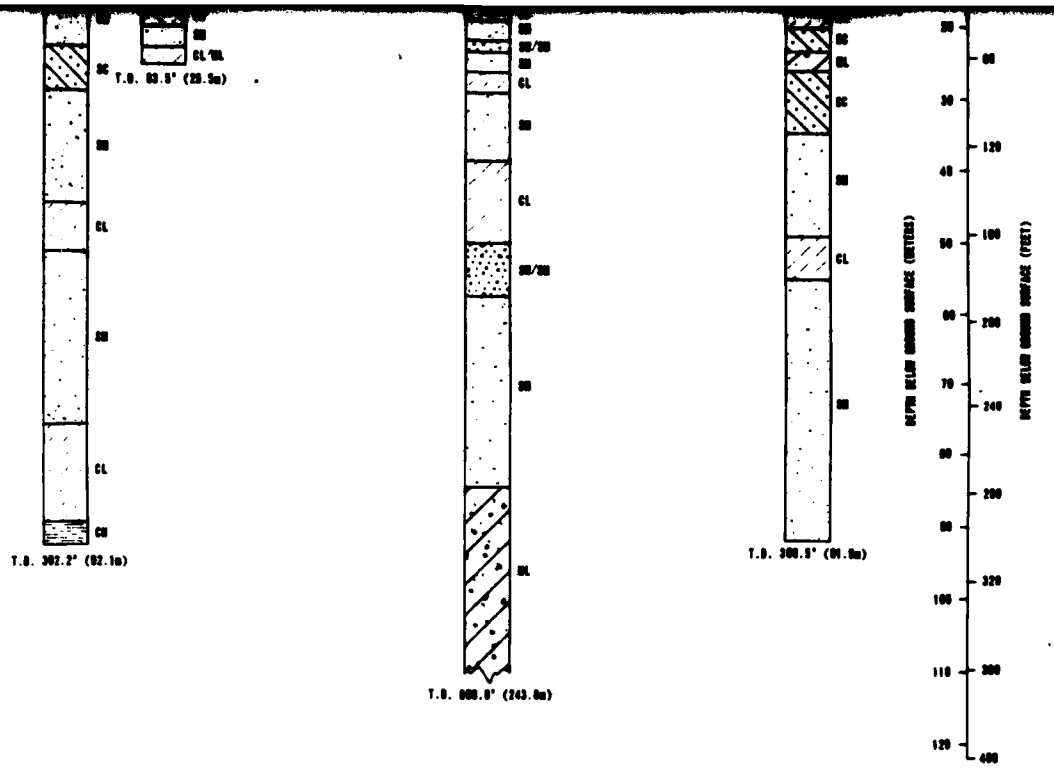
TUTE MILES

10 20

TICAL MILES

10 20

LOMETERS



HORIZONTAL SCALE

UTE MILES 0 2 4 6

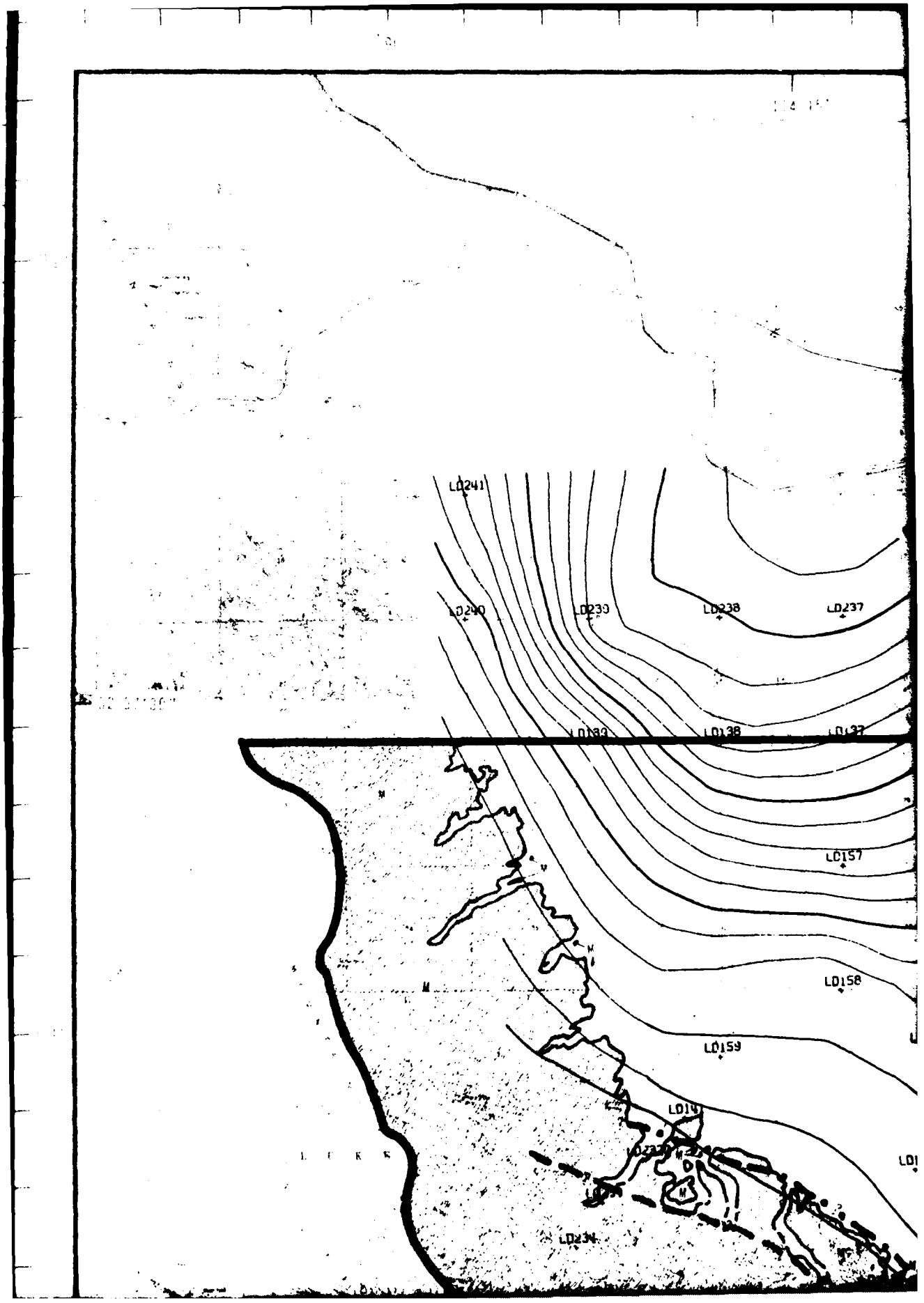
ILOMETERS 0 2 6

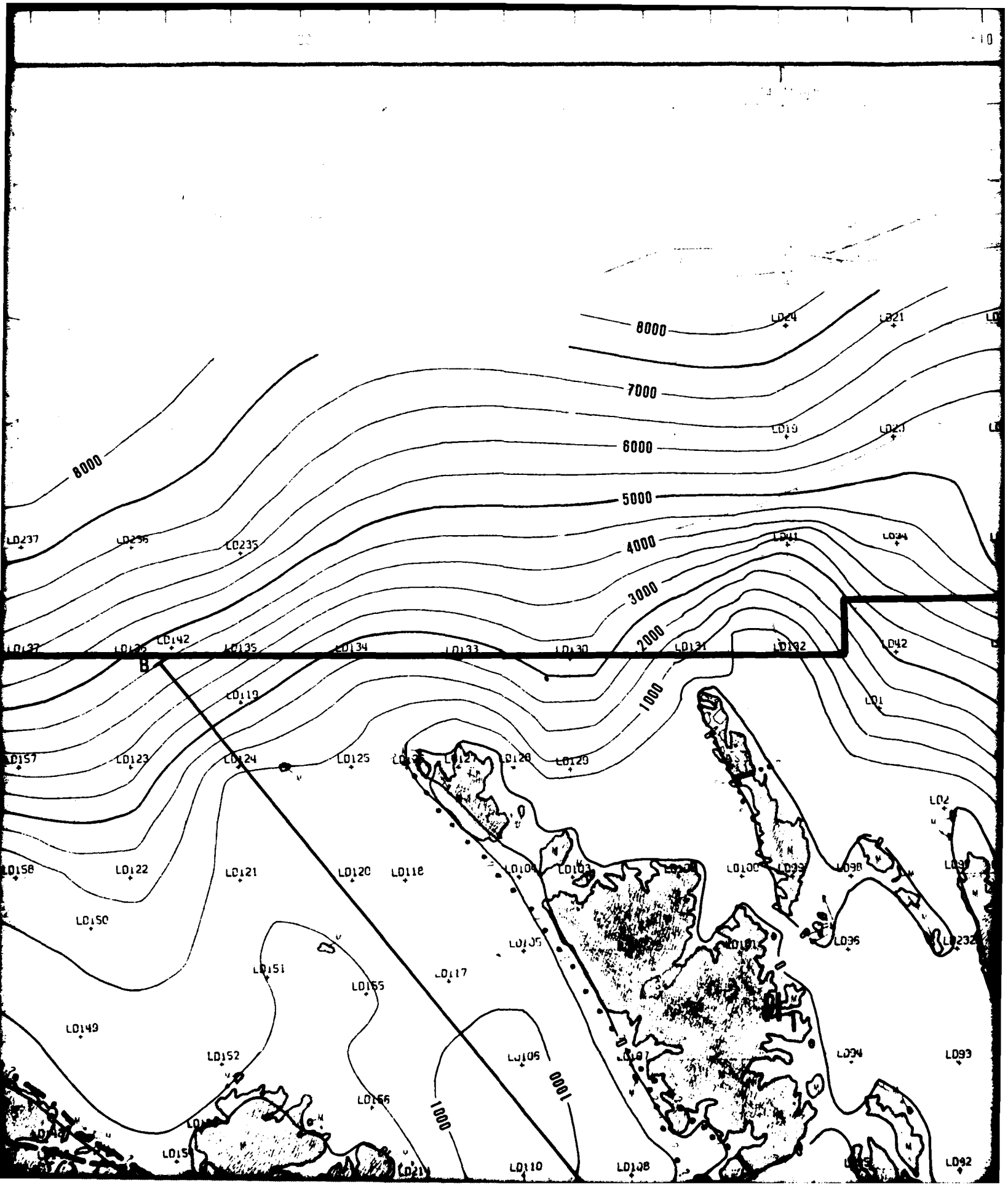
SOIL PROFILES
LECHUGUILLA DESERT, ARIZONA

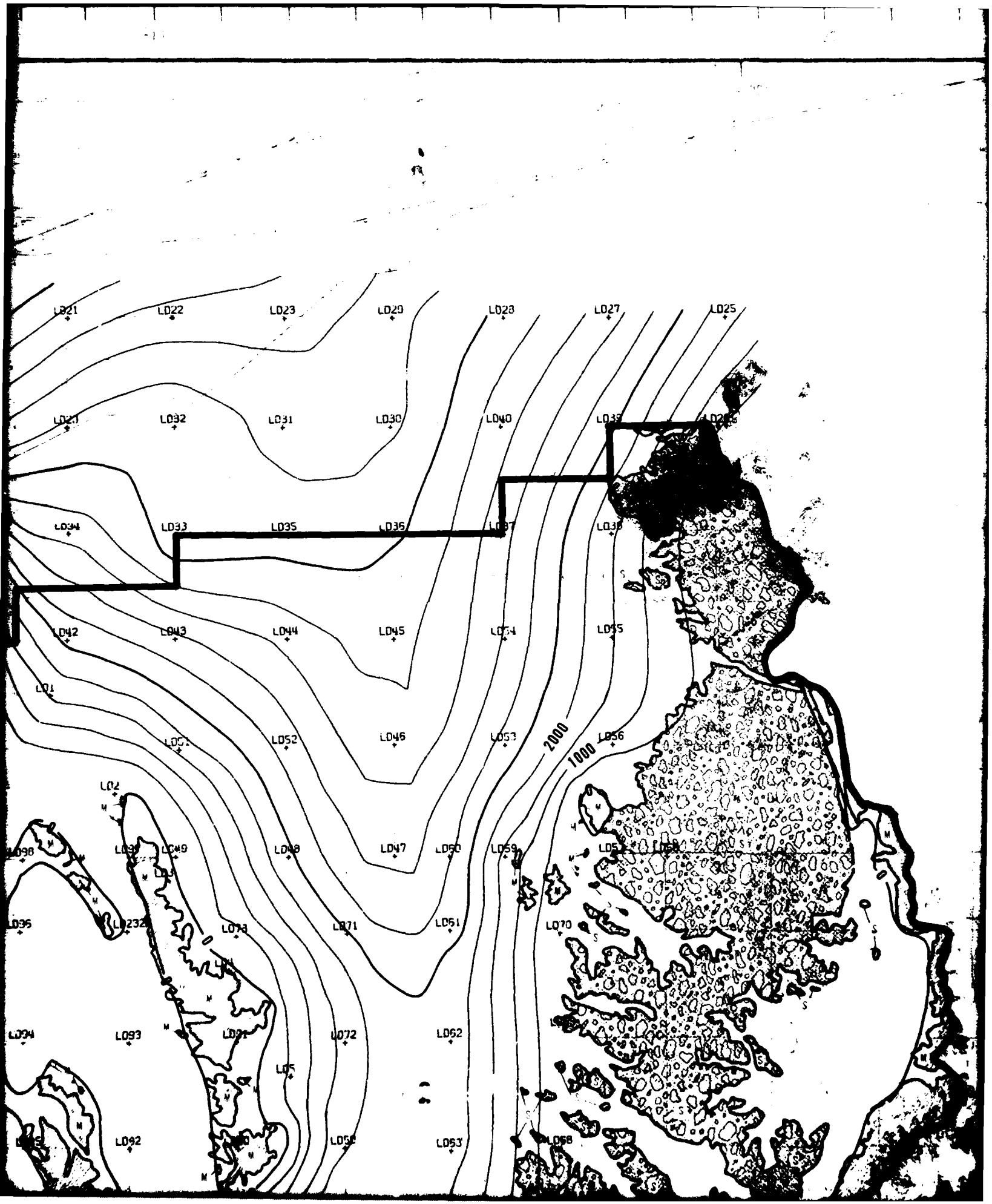
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

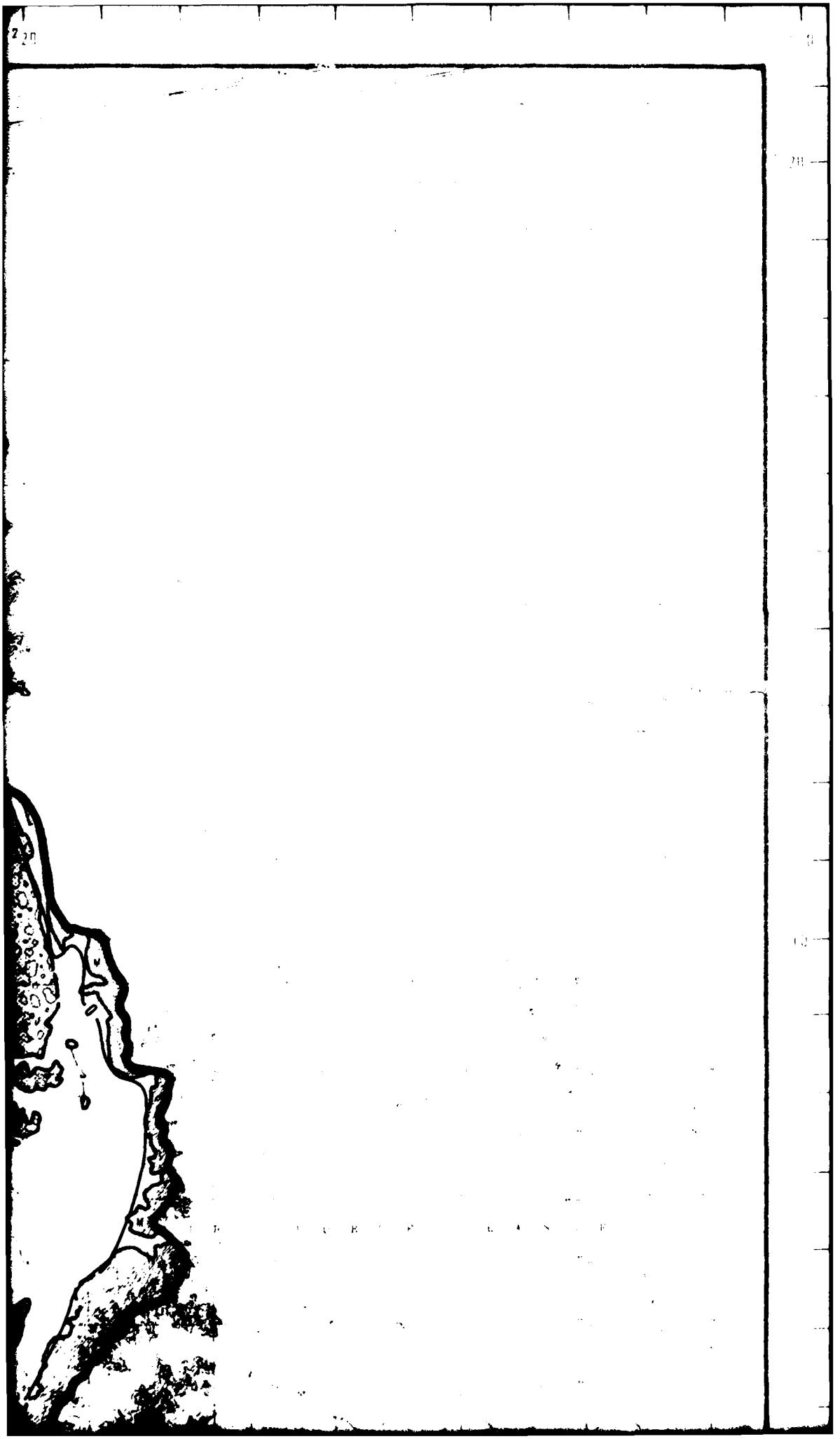
DRAWING
3.5-C

FUGRO NATIONAL, INC.


LD241
LD240
LD239
LD238
LD237
LD157
LD158
LD159

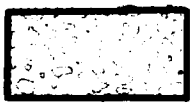

8000
7000
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LD237
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LD72
LD62
LD5
LD92
LD63



EXPLANATION

ROCK UNITS



Sedimentary (S); Predominantly arkosic sandstone and granite-gneiss boulder conglomerate (massively to indistinctly bedded); cobble and boulder clasts in conglomerate are predominantly biotite-quartz monzonite, schist, and gneiss.



Igneous; Intrusive (I1); predominantly fine to coarse grained quartz monzonite.
Igneous; Extrusive (I2); predominantly basalt.



Metamorphic (M); Metamorphic complexes of gneiss and schist; mineral compositions of quartz, feldspar, biotite, muscovite, amphibole, and epidote.

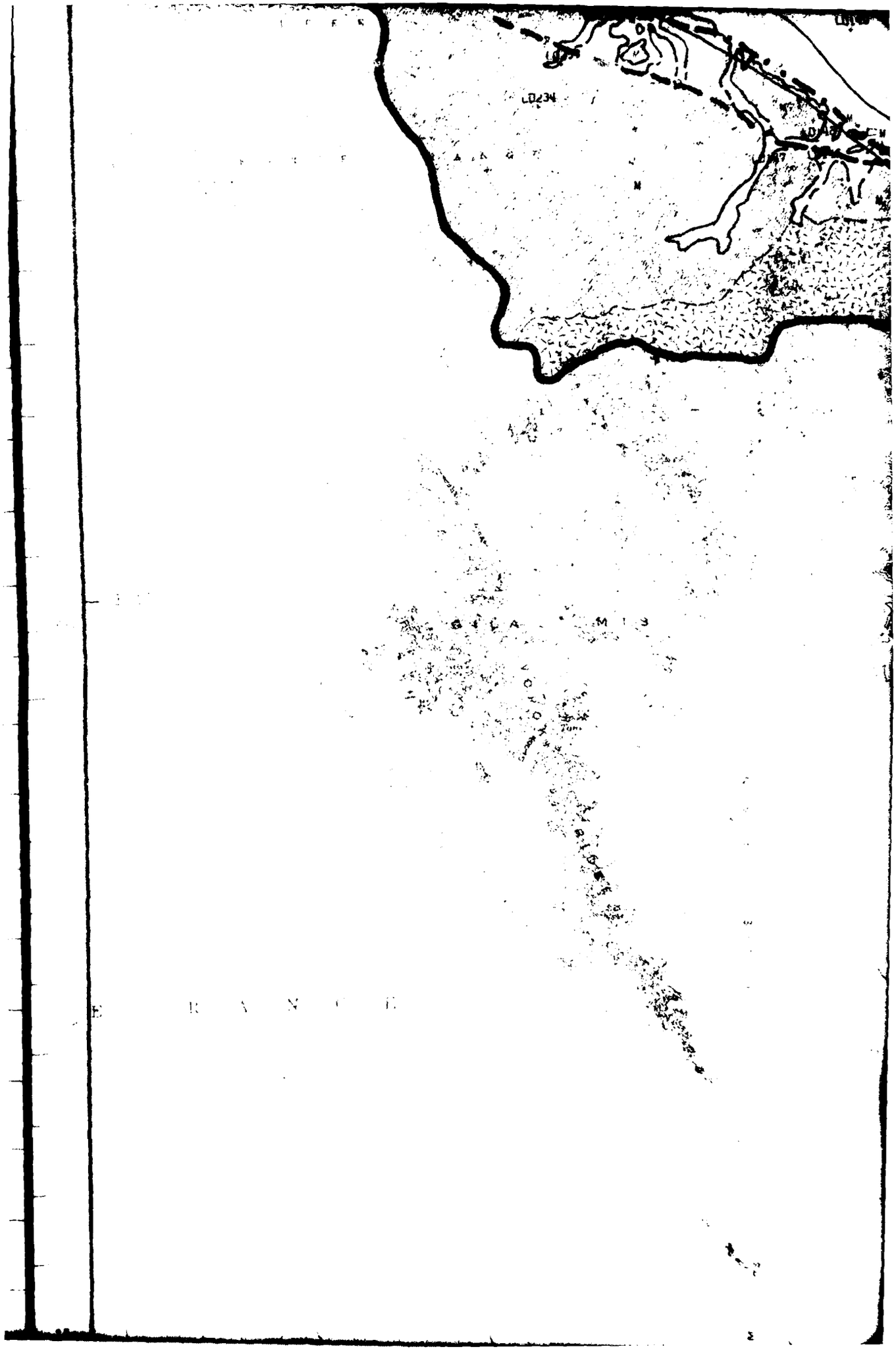
SURFICIAL BASIN-FILL UNITS

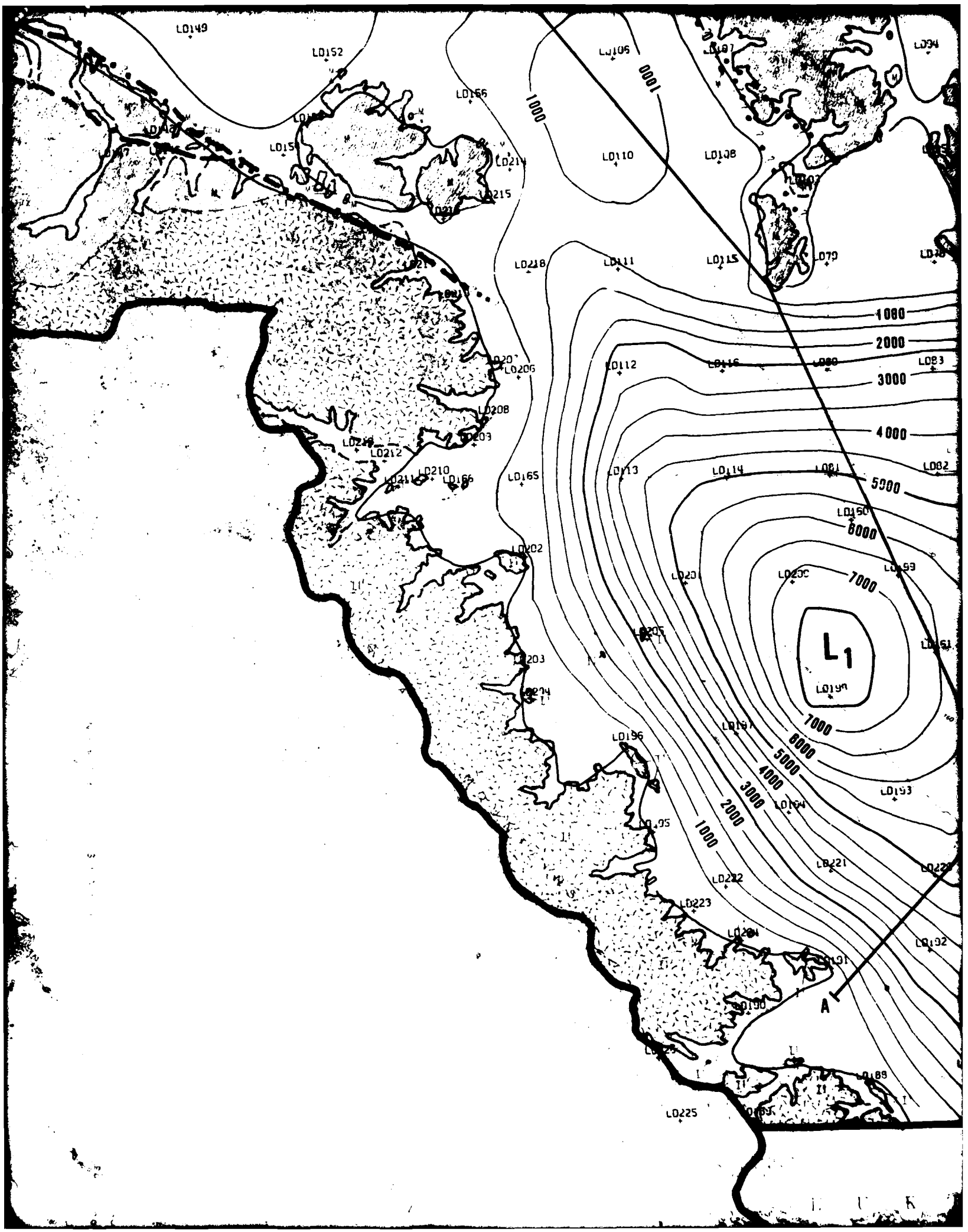


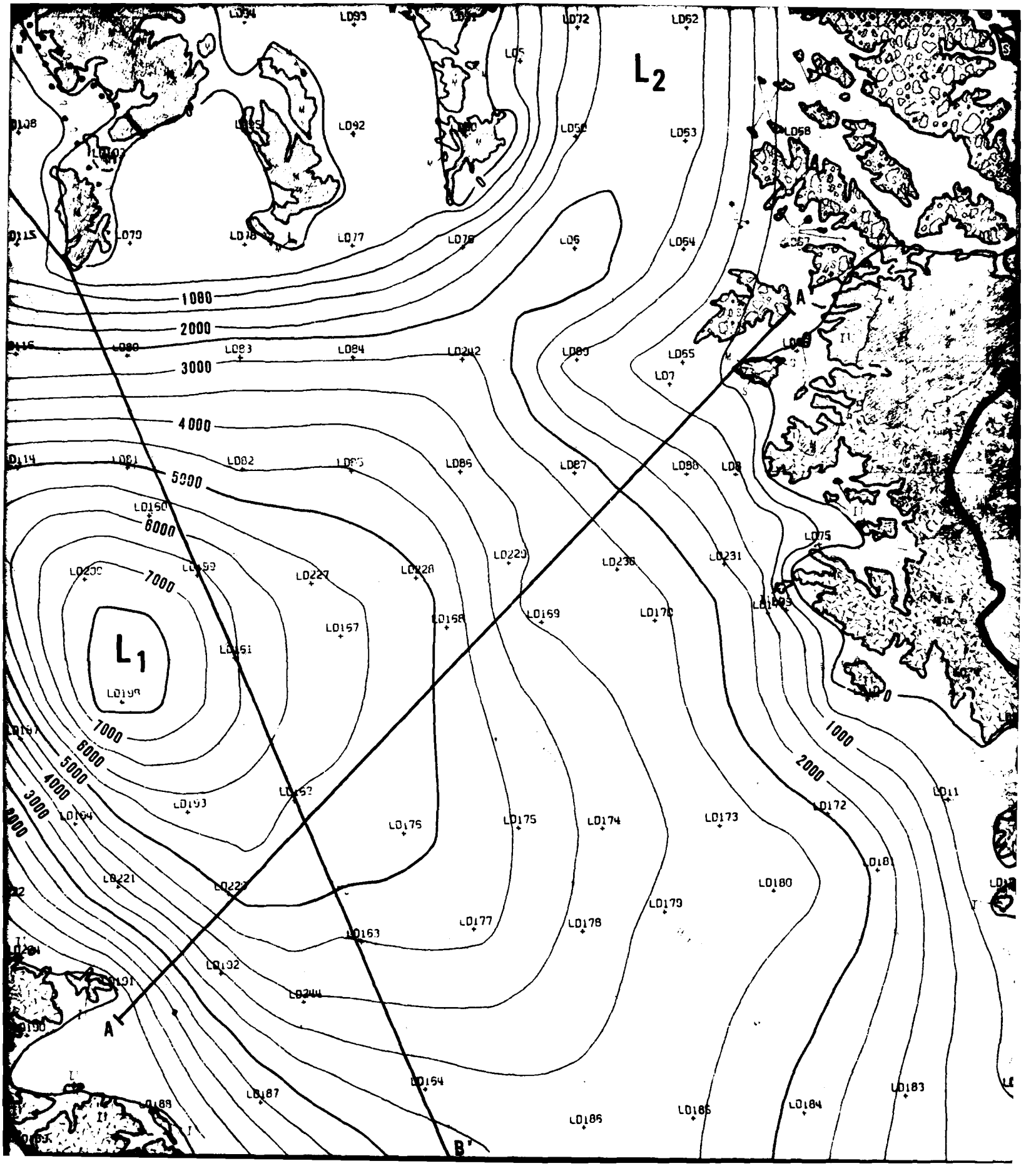
Undifferentiated Alluvium

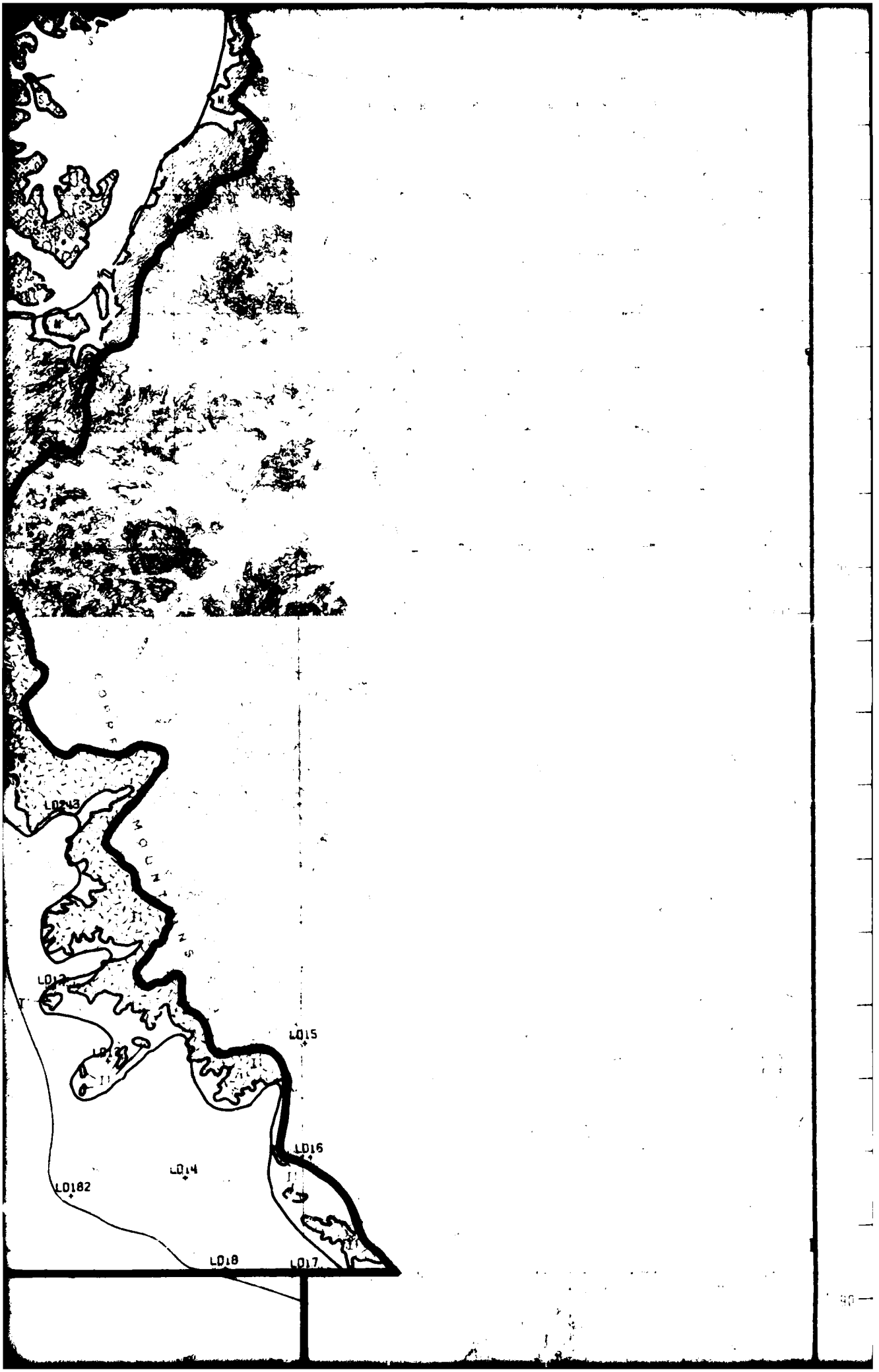
SYMBOLS

APPROXIMATE DEPTH TO BASEMENT CONTOUR: Contour interval 500 feet (154 meters); zero depth




1000
1000
1000
2000
3000
4000
5000
6000
7000
7000
6000
5000
4000
3000
2000
1000
L1
A


L2
L1
1000
2000
3000
4000
5000
6000
7000
A
B'


LD13
LD12
LD15
LD16
LD14
LD182
LD18
LD17

M

Metamorphic (M); metamorphic complexes of gneiss and schist, undivided compositions of quartz, feldspar, biotite, muscovite, amphibole, and epidote.

SURFICIAL BASIN-FILL UNITS

Undifferentiated Alluvium

SYMBOLS

APPROXIMATE DEPTH TO BASEMENT CONTOUR; Contour interval 500 feet (154 meters); zero depth contour represents generalized outline of basement rock outcrop. All others are computer derived in combination with manual adjustment where necessary to better fit zero contour configuration.

GEOLOGIC CONTACT; Rock/basin fill where line is solid, rock and colluvium/basin fill where line is dashed. (Colluvium cannot be illustrated at presentation scale due to limited extent).

FAULT; Approximately located, dotted where concealed by surficial deposits, queried where existence uncertain.

A A'
LD-G/MP-AA'

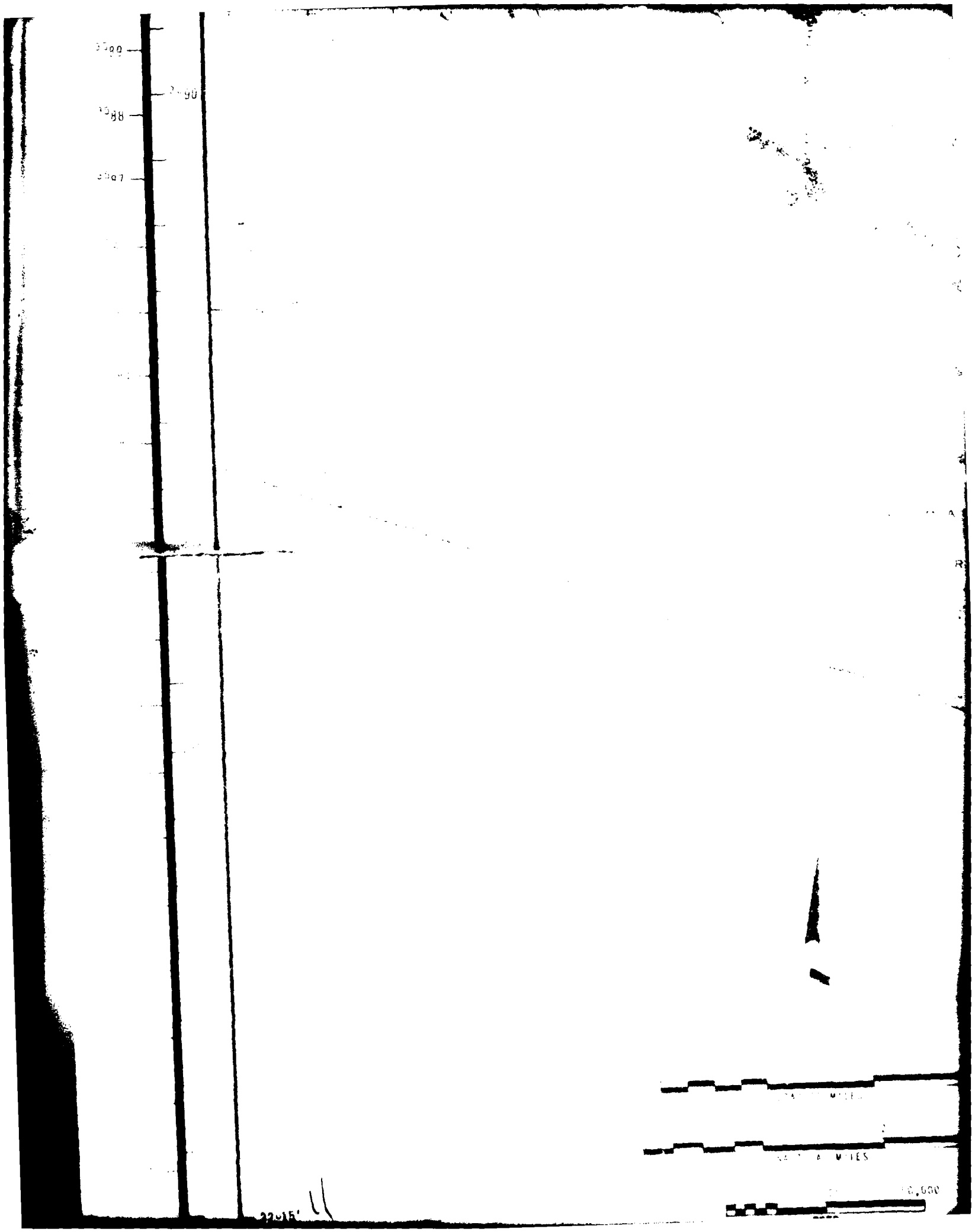
Line of Gravity/Magnetic Profile

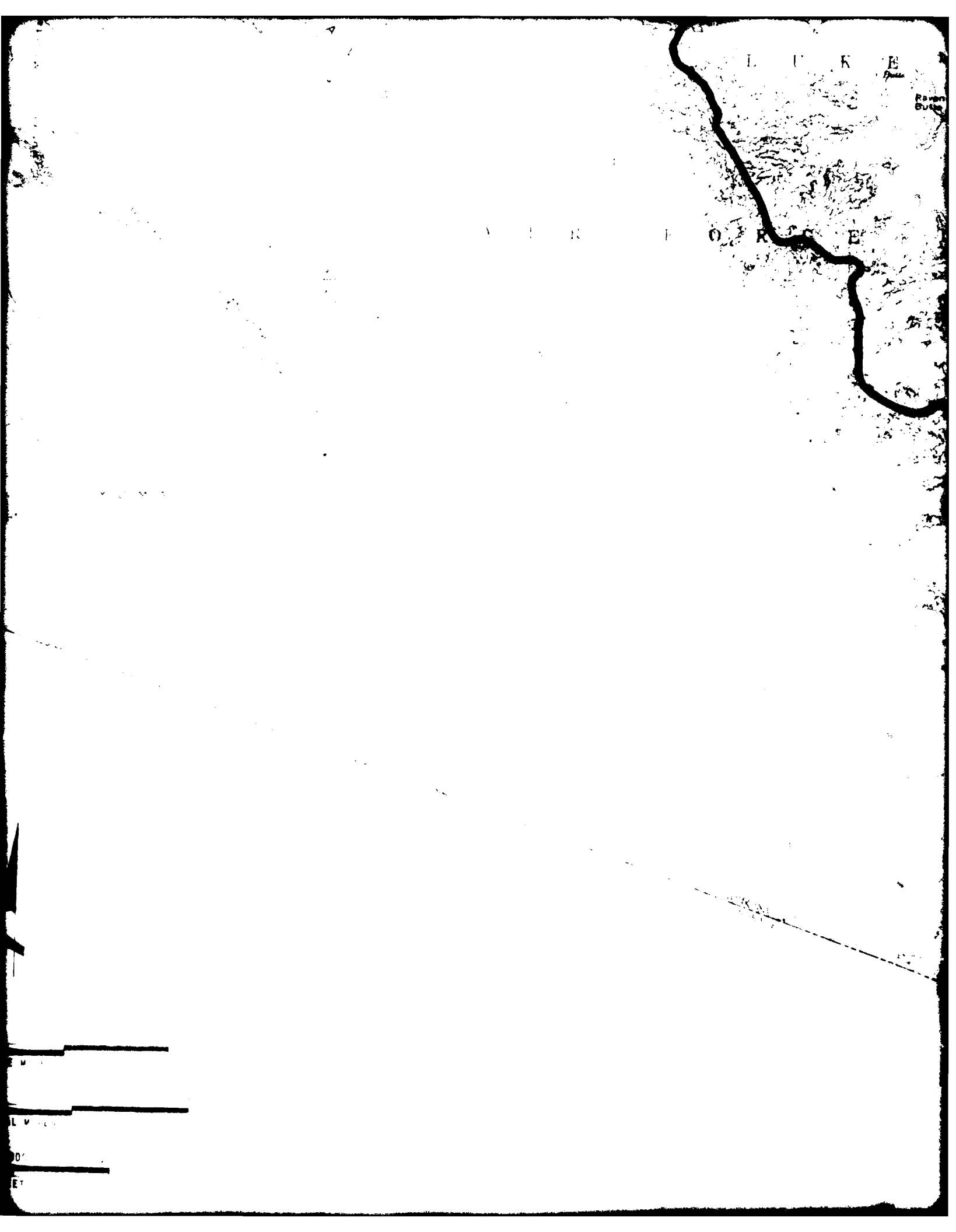
GRAVITY ANOMALIES

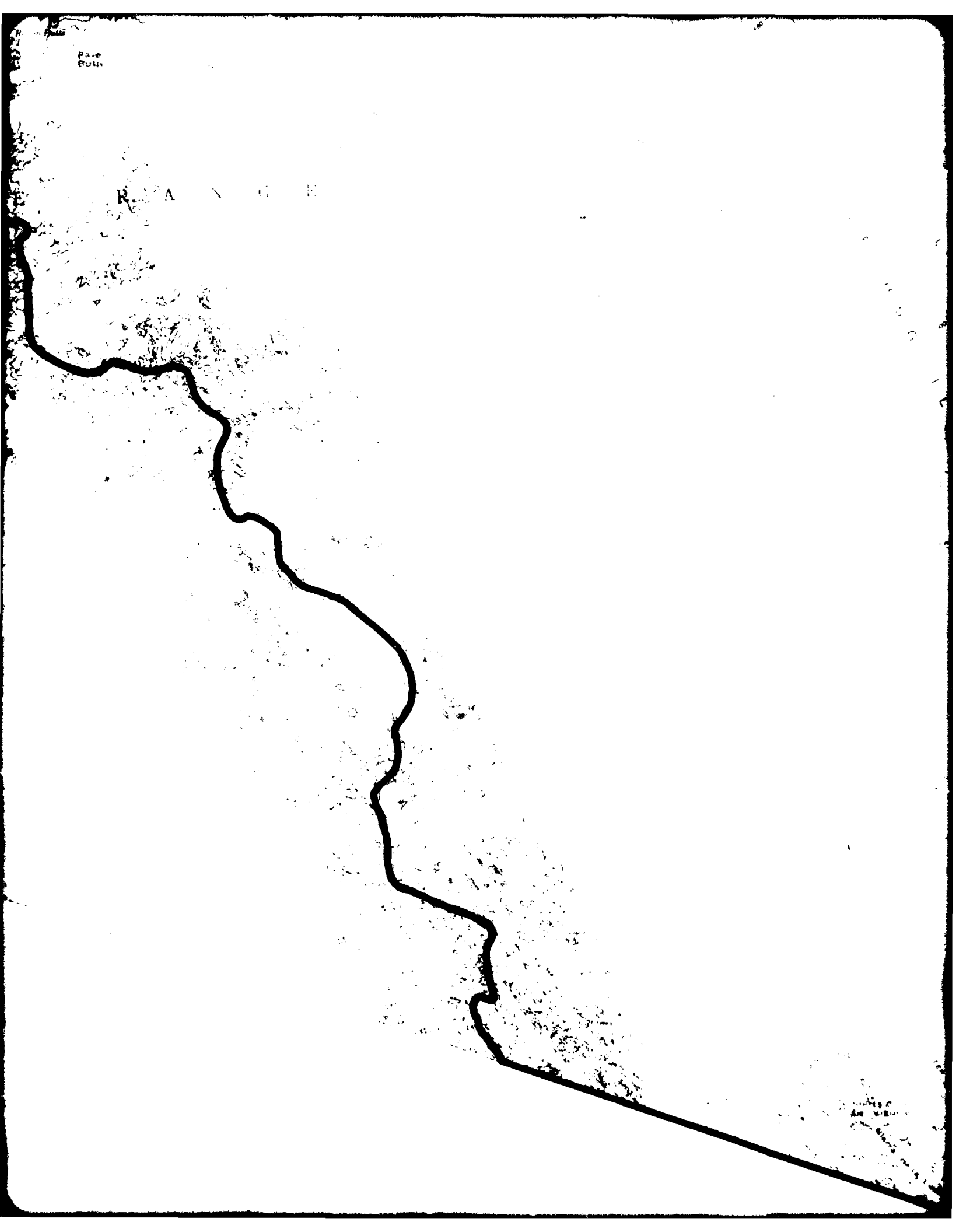
L_n RELATIVE BASEMENT LOW

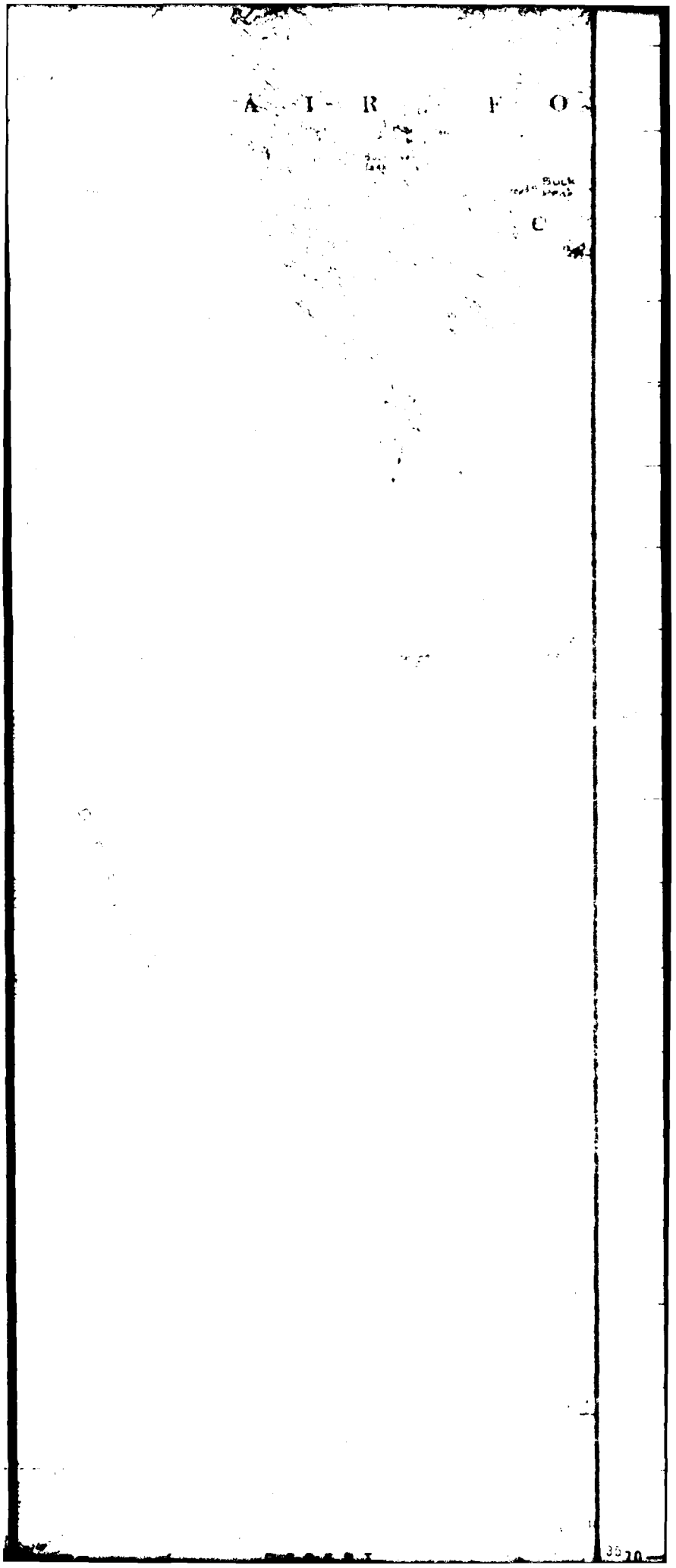
H_n RELATIVE BASEMENT HIGH

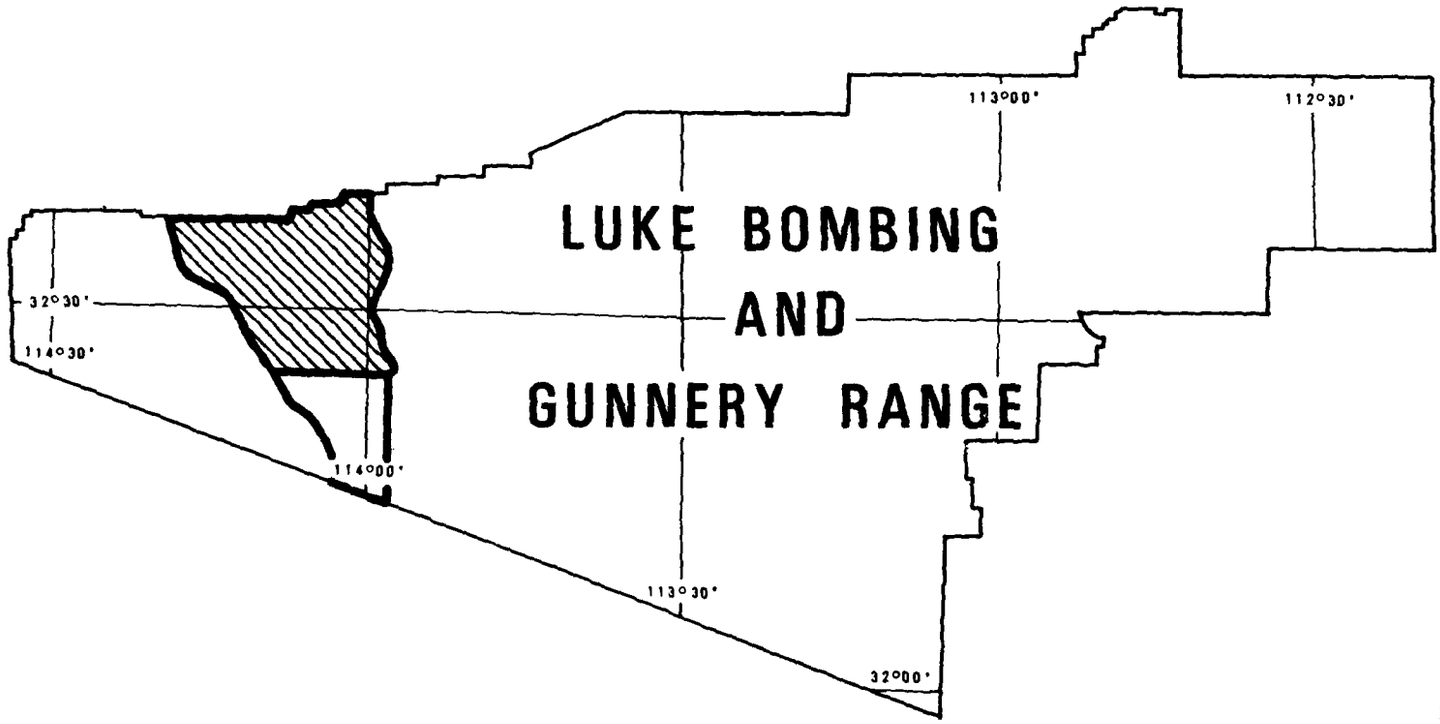
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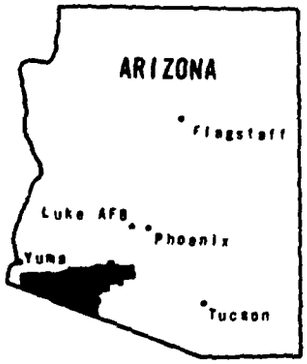



L A K E
O R E



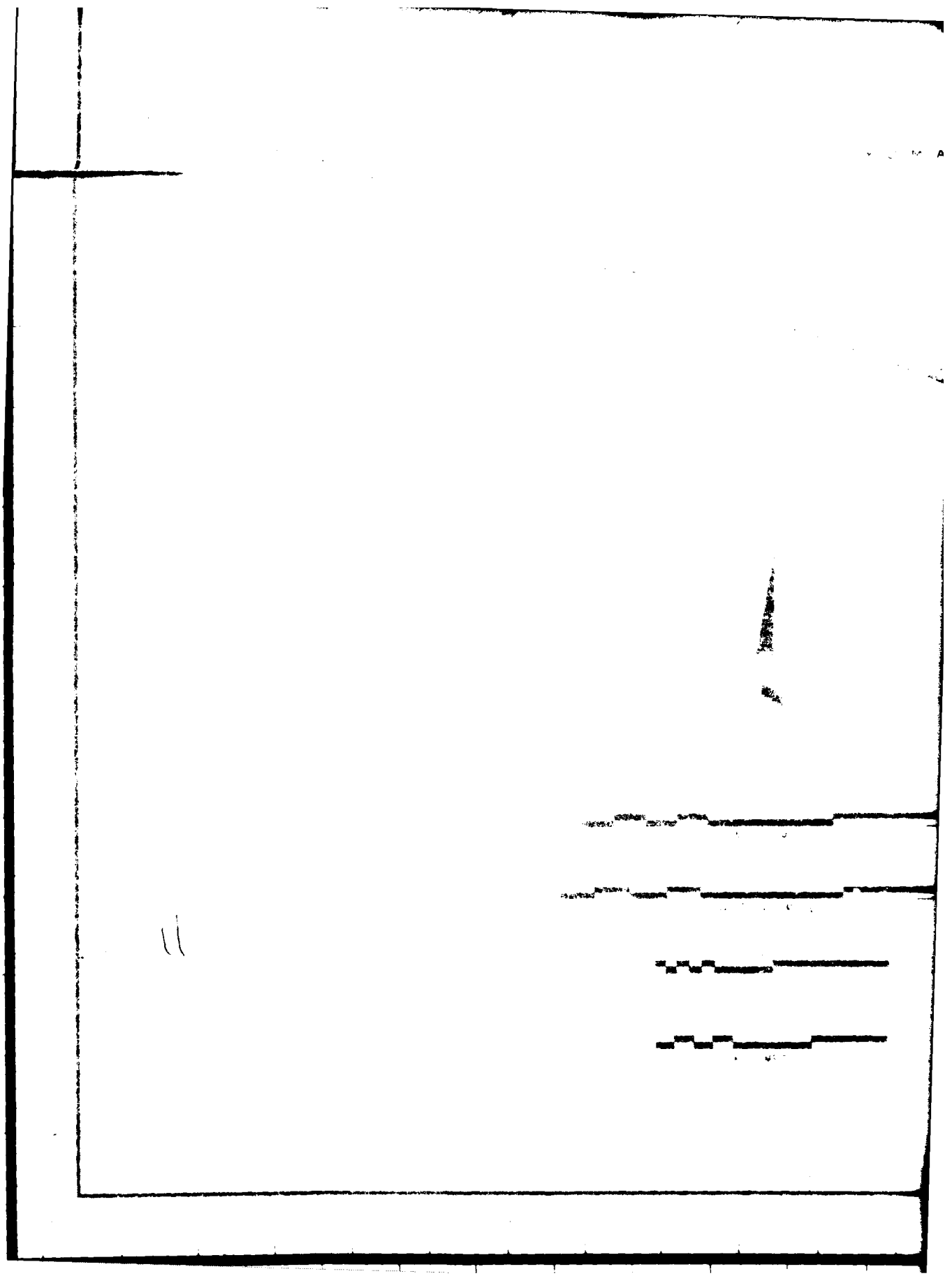

A I R F O
C

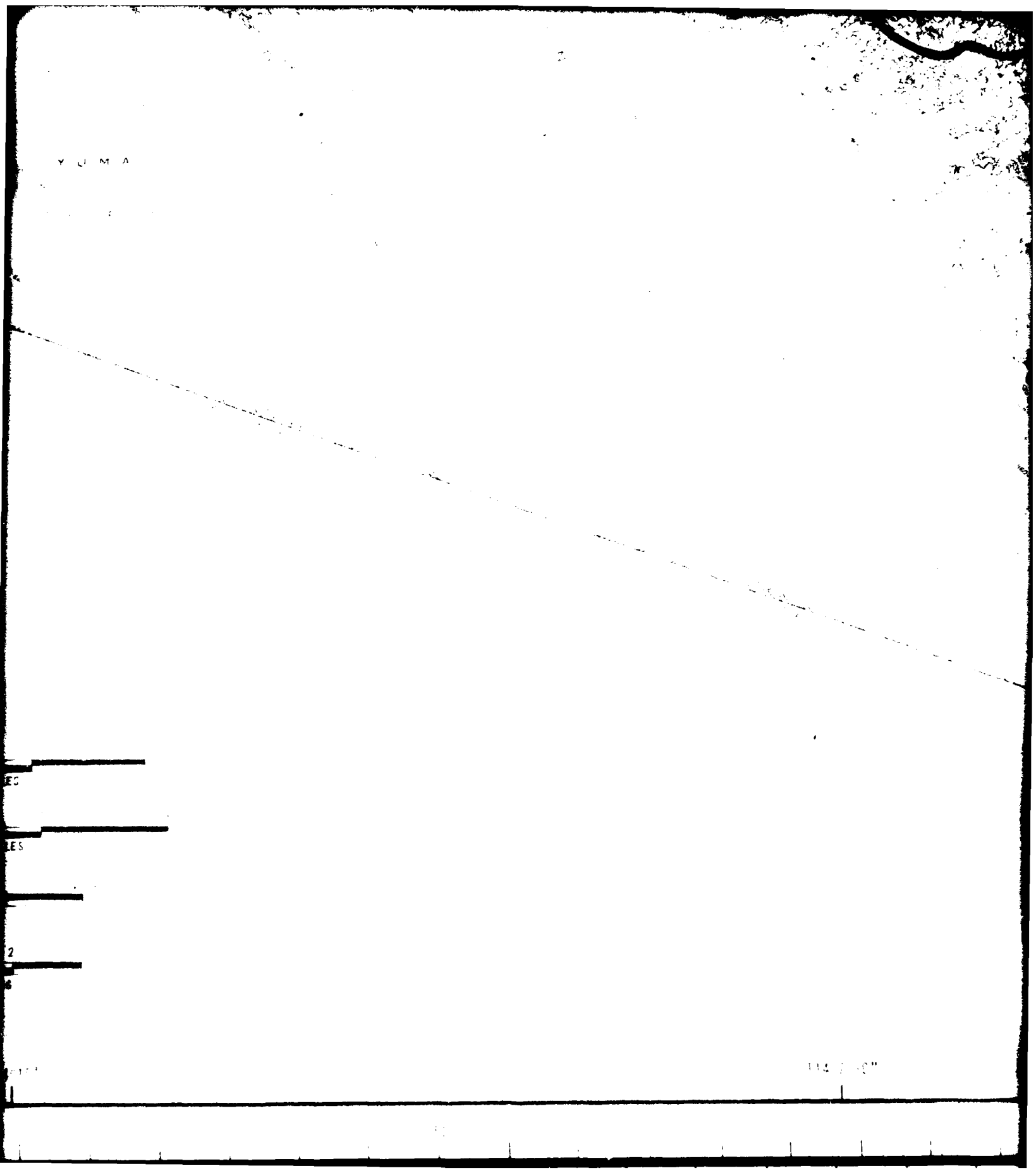


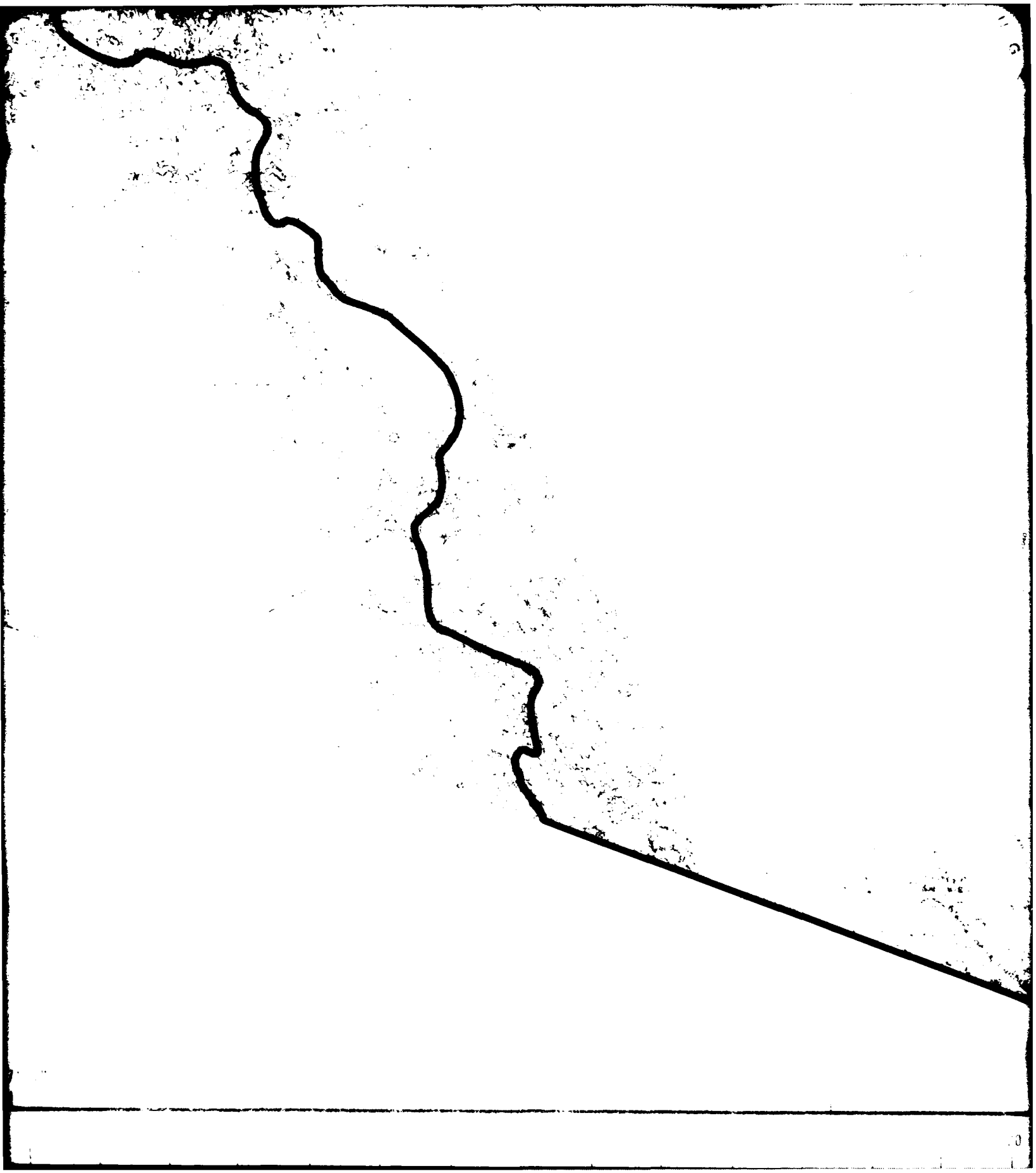


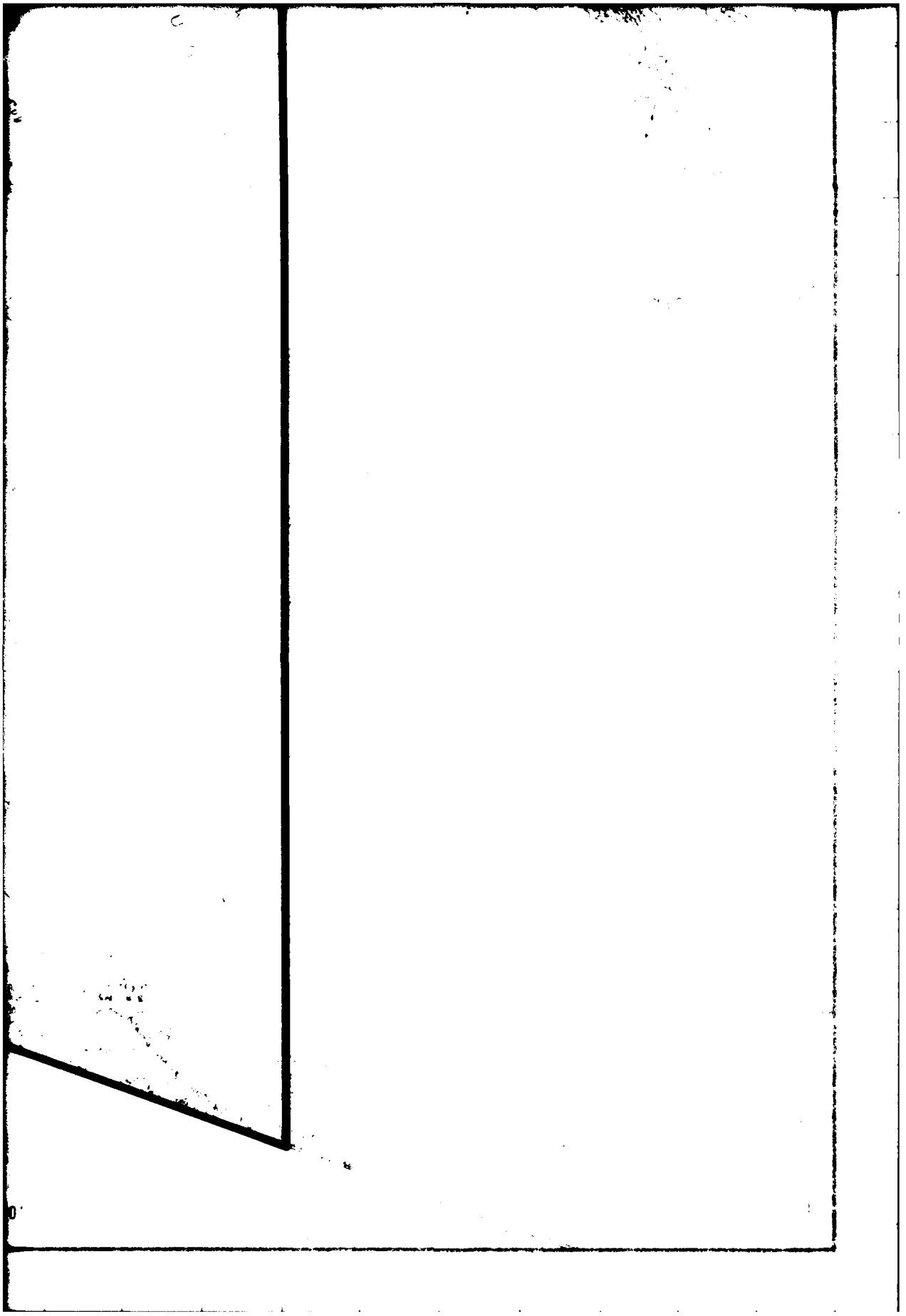
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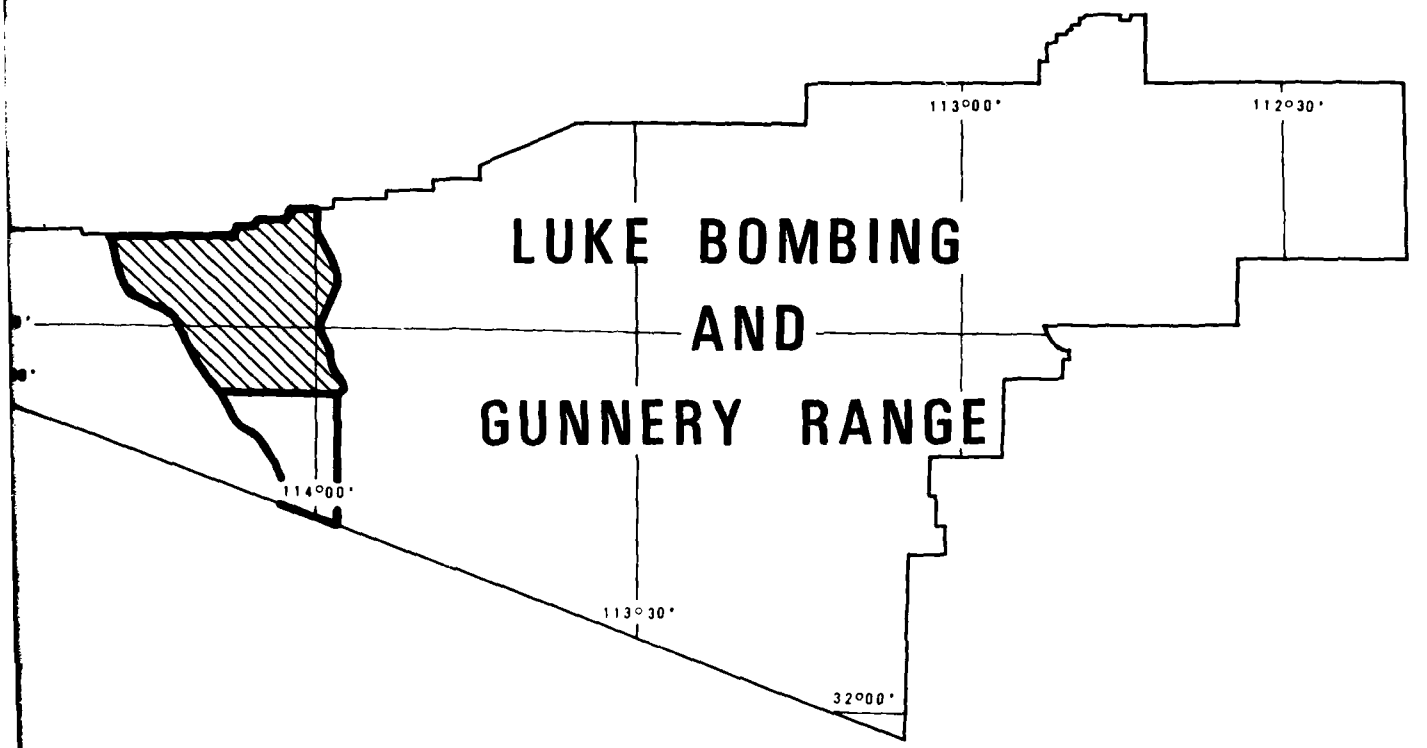
DEPTH TO BASEMENT
LECHUGUILLA DESERT, AR

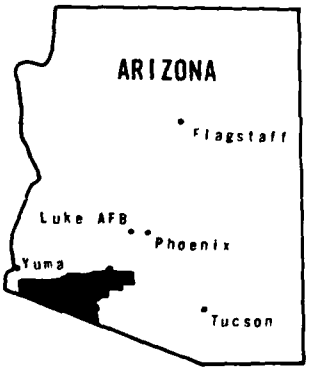



YUMA









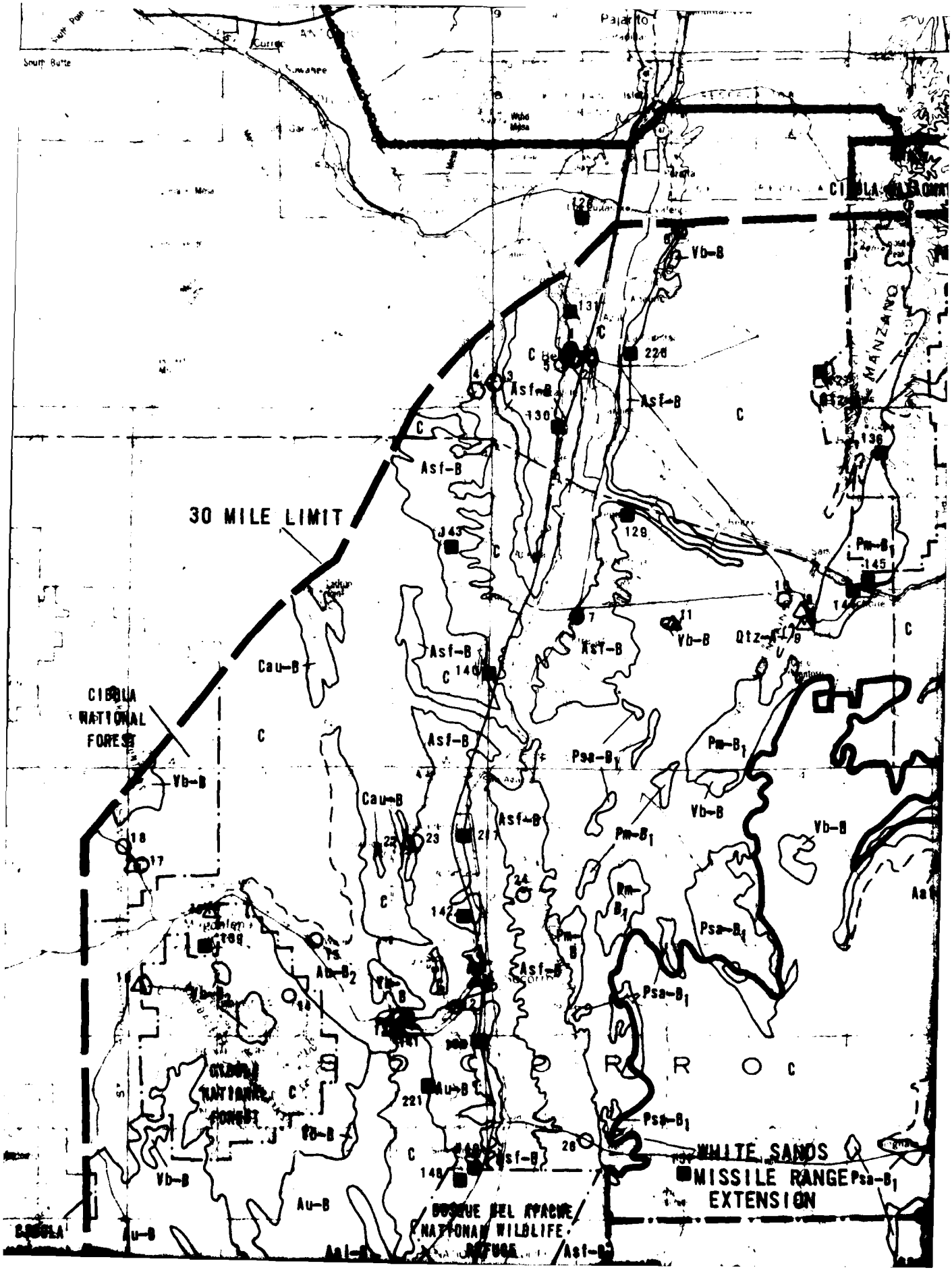
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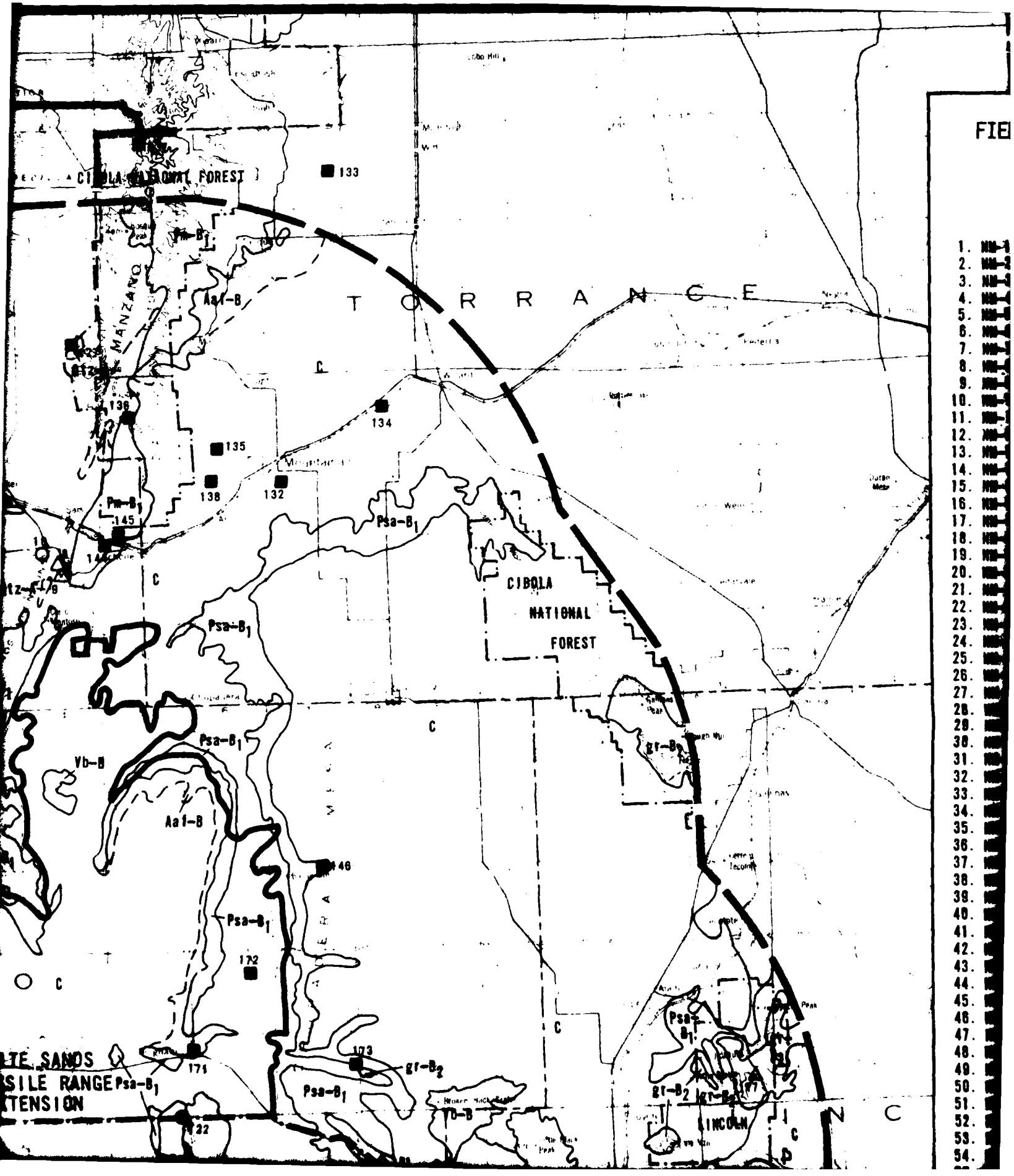
DEPTH TO BASEMENT
LECHUGUILLA DESERT, ARIZONA

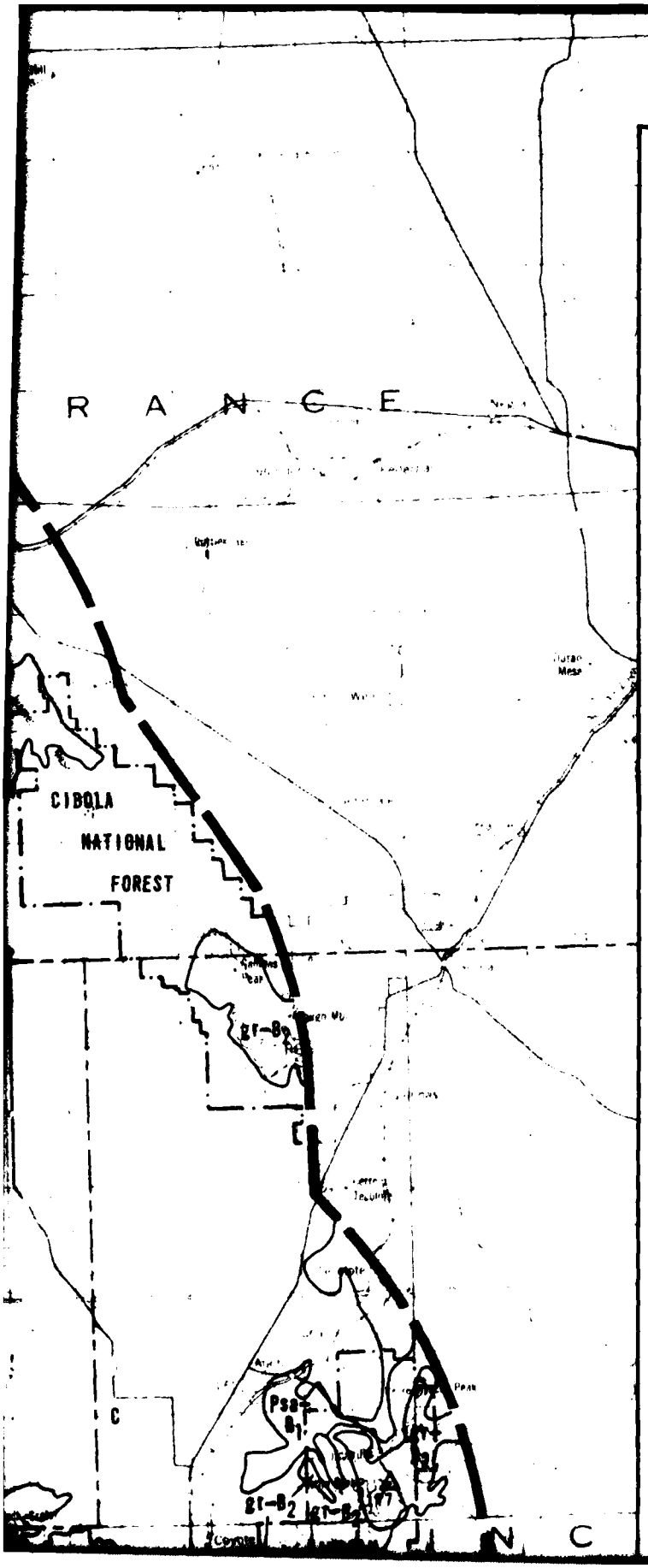
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

DRAWING
3.5-

FUGRO NATIONAL, INC.

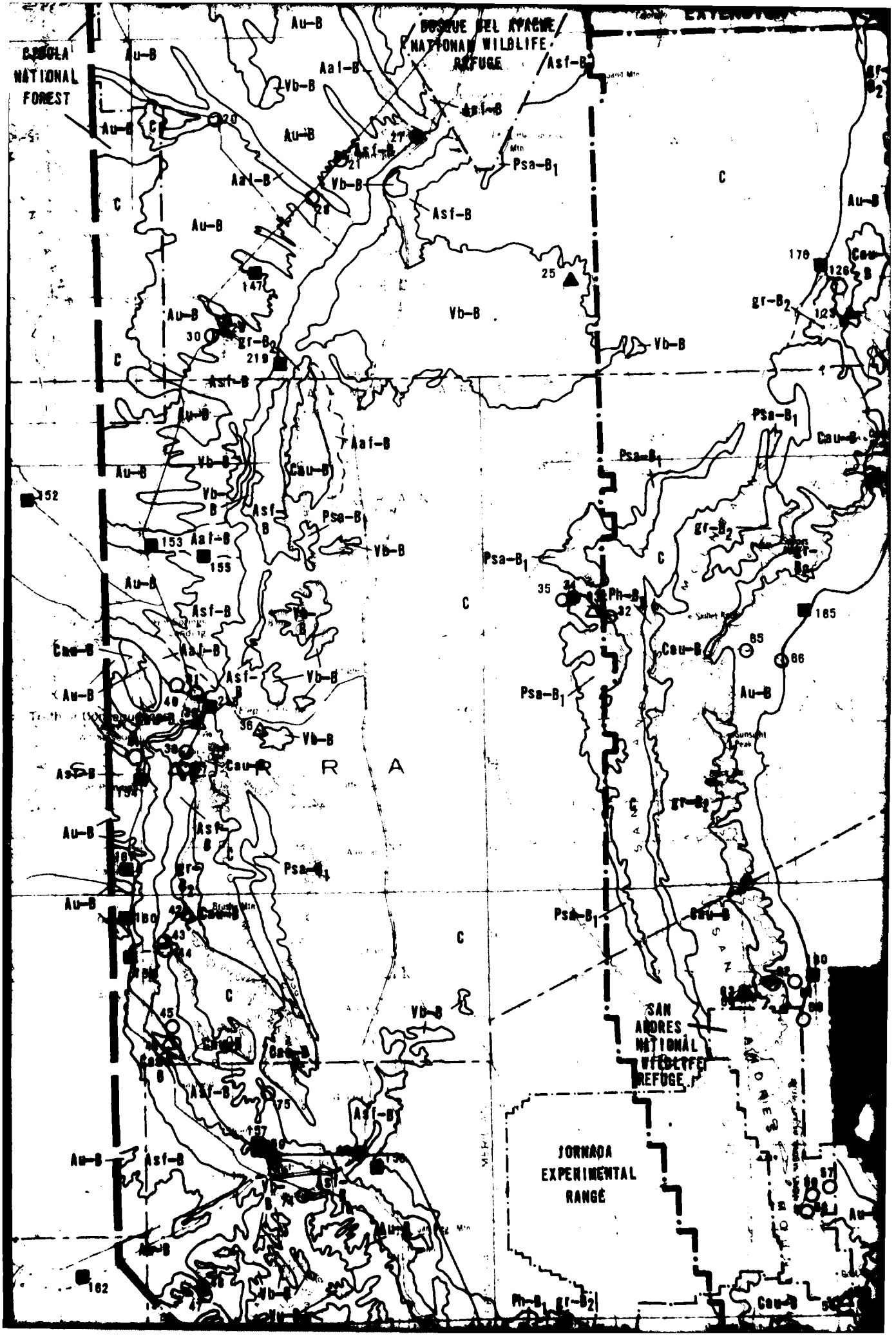

30 MILE LIMIT
CIBOLA NATIONAL FOREST
MANZANO
WHITE SANDS MISSILE RANGE EXTENSION
BOSQUE DEL APACHE NATIONAL WILDLIFE REFUGE
Vb-B
Asf-B
Cau-B
Au-B
Psa-B1
Pm-B1
Qtz-A1/8
C
R R O C

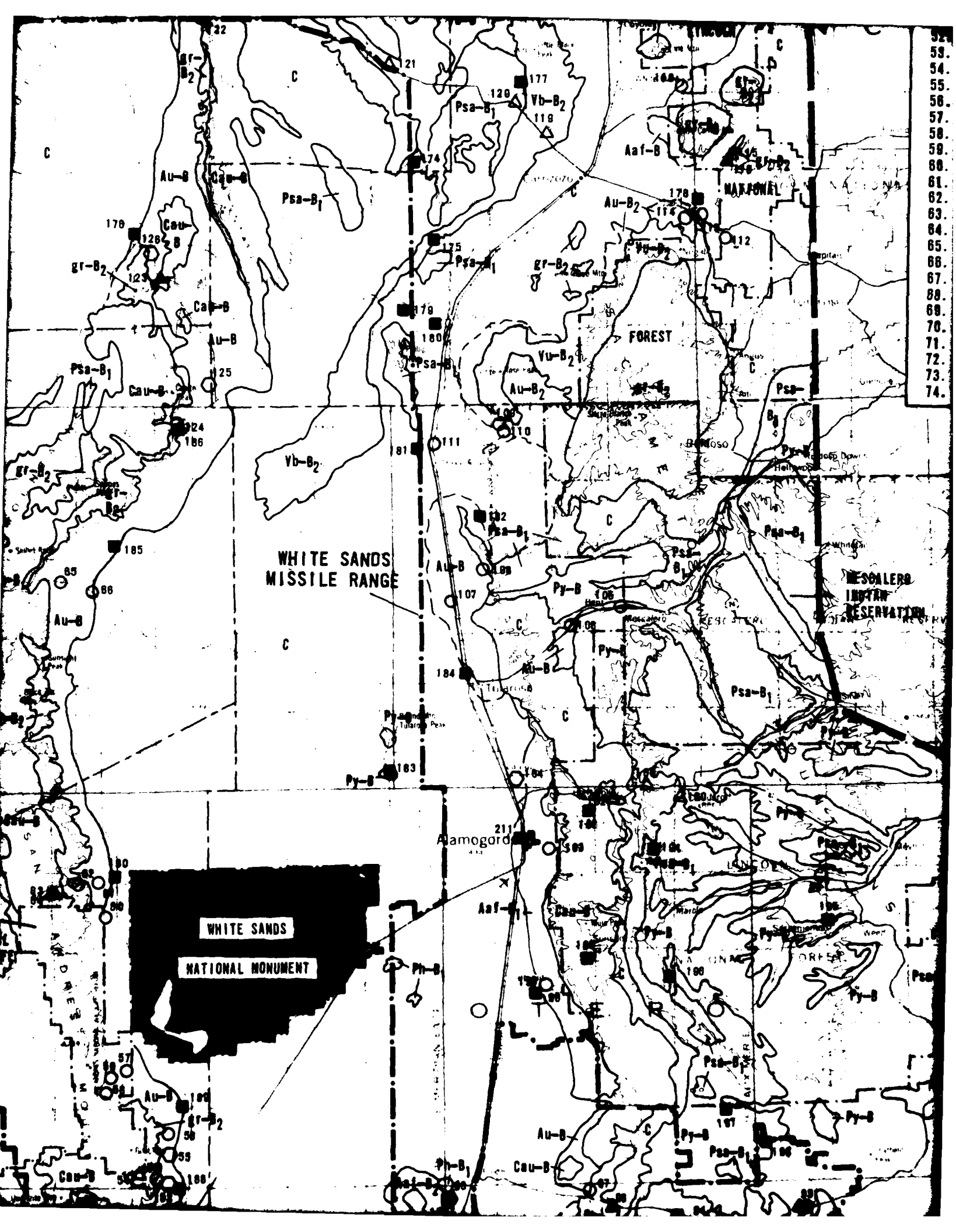

CIBOLA NATIONAL FOREST
T O R R A N C E
MANZANO
133
134
135
136
138
132
145
146
172
171
173
122
Pm-B1
Aa1-B
Psa-B1
Vb-B
gr-B2
CIBOLA
NATIONAL
FOREST
LINCOLN
FIE

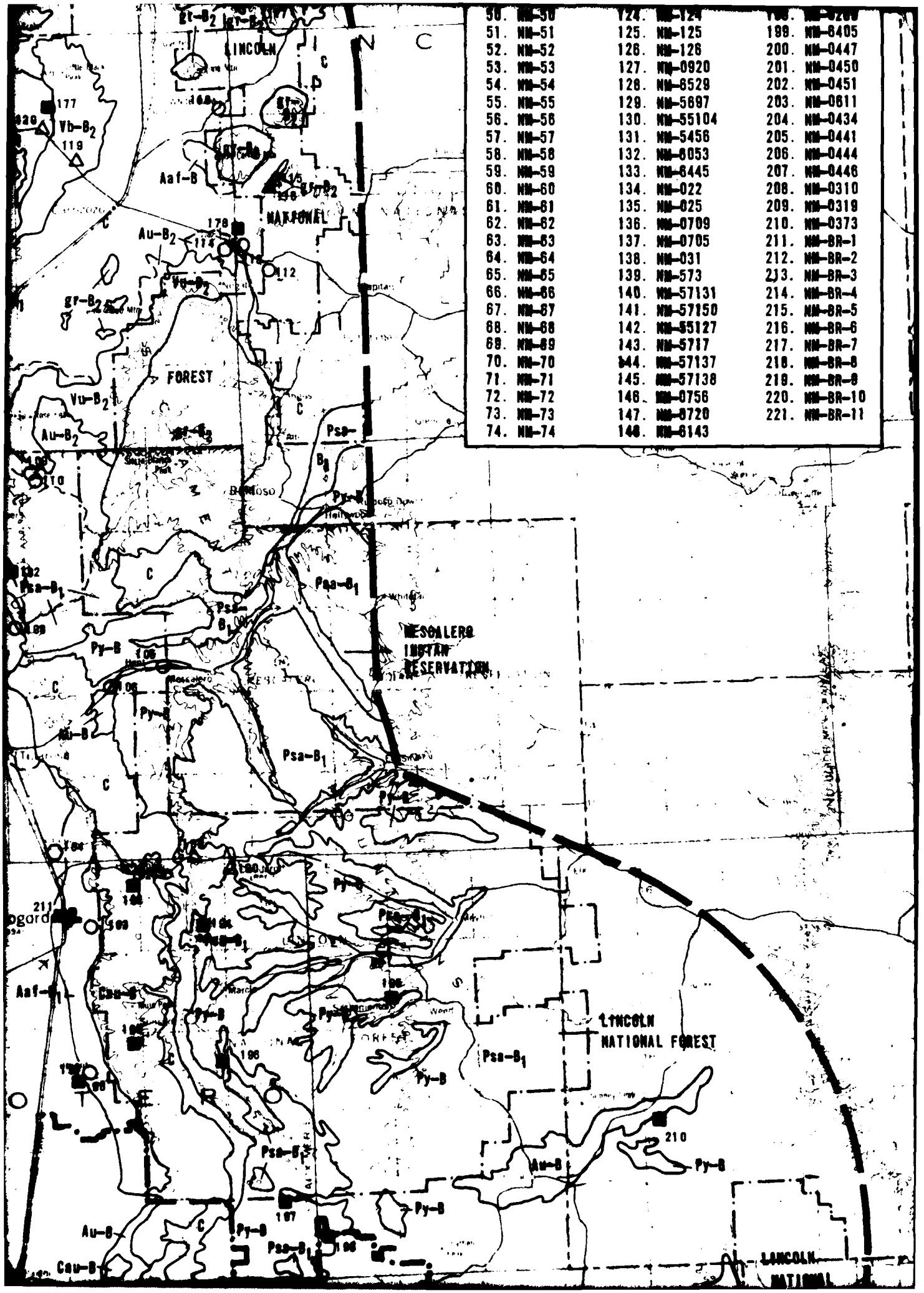


FIELD STATION CROSS REFERENCE NUMBERING GUIDE

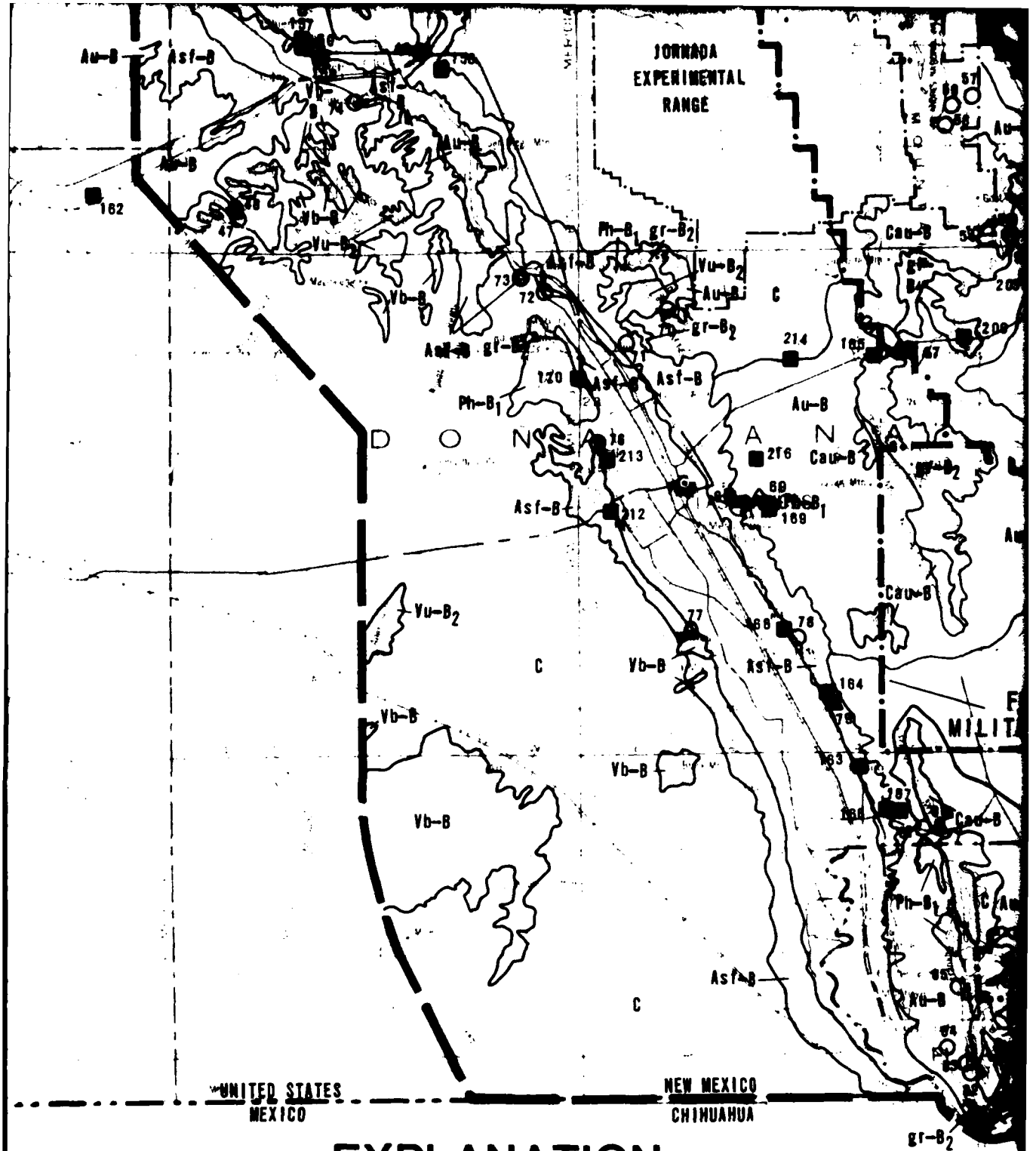
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2. NM-2	76. NM-76	150. NM-5912
3. NM-3	77. NM-77	151. NM-607
4. NM-4	78. NM-78	152. NM-6577
5. NM-5	79. NM-79	153. NM-6519
6. NM-6	80. NM-80	154. NM-6539
7. NM-7	81. NM-81	155. NM-713
8. NM-8	82. NM-82	156. NM-6215
9. NM-9	83. NM-83	157. NM-631
10. NM-10	84. NM-84	158. NM-632
11. NM-11	85. NM-85	159. NM-6411
12. NM-12	86. NM-86	160. NM-6429
13. NM-13	87. NM-87	161. NM-6515
14. NM-14	88. NM-88	162. NM-6817
15. NM-15	89. NM-89	163. NM-5439
16. NM-16	90. NM-90	164. NM-5555
17. NM-17	91. NM-91	165. NM-5619
18. NM-18	92. NM-92	166. NM-5791
19. NM-19	93. NM-93	167. NM-5792
20. NM-20	94. NM-94	168. NM-5918
21. NM-21	95. NM-95	169. NM-6046
22. NM-22	96. NM-96	170. NM-6425
23. NM-23	97. NM-97	171. NM-0519
24. NM-24	98. NM-98	172. NM-0520
25. NM-25	99. NM-99	173. NM-0523
26. NM-26	100. NM-100	174. NM-0529
27. NM-27	101. NM-101	175. NM-0530
28. NM-28	102. NM-102	176. NM-0609
29. NM-29	103. NM-103	177. NM-0560
30. NM-30	104. NM-104	178. NM-0564
31. NM-31	105. NM-105	179. NM-0543
32. NM-32	106. NM-106	180. NM-0544
33. NM-33	107. NM-107	181. NM-0547
34. NM-34	108. NM-108	182. NM-0549
35. NM-35	109. NM-109	183. NM-0553
36. NM-36	110. NM-110	184. NM-0554
37. NM-37	111. NM-111	185. NM-0605
38. NM-38	112. NM-112	186. NM-0606
39. NM-39	113. NM-113	187. NM-5848
40. NM-40	114. NM-114	188. NM-0598
41. NM-41	115. NM-115	189. NM-0601
42. NM-42	116. NM-116	190. NM-6802
43. NM-43	117. NM-117	191. NM-5854
44. NM-44	118. NM-118	192. NM-5941
45. NM-45	119. NM-119	193. NM-0247
46. NM-46	120. NM-120	194. NM-0246
47. NM-47	121. NM-121	195. NM-0270
48. NM-48	122. NM-122	196. NM-0281
49. NM-49	123. NM-123	197. NM-0288
50. NM-50	124. NM-124	198. NM-0289
51. NM-51	125. NM-125	199. NM-6405
52. NM-52	126. NM-126	200. NM-0447


CABALLO NATIONAL FOREST
BOSQUE DEL APACHE NATIONAL WILDLIFE REFUGE
SAN ANDRES NATIONAL WILDLIFE REFUGE
JORNADA EXPERIMENTAL RANGE
R A
Au-B
Aaf-B
Asf-B
Vb-B
Psa-B1
gr-B2
Cau-B
Ph-B
C


WHITE SANDS
MISSILE RANGE
WHITE SANDS
NATIONAL MONUMENT
MESCALERO
INDIAN
RESERVATION
FOREST
NATIONAL
Alamogordo
Aaf-B
Au-B
Cau-B
Psa-B1
Vb-B2
gr-B2
Py-B
Ph-B
Ph-B1



50.	NM-50	124.	NM-124	198.	NM-8269
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54.	NM-54	128.	NM-8529	202.	NM-0451
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57.	NM-57	131.	NM-5456	205.	NM-0441
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61.	NM-61	135.	NM-025	209.	NM-0319
62.	NM-62	136.	NM-0709	210.	NM-0373
63.	NM-63	137.	NM-0705	211.	NM-BR-1
64.	NM-64	138.	NM-031	212.	NM-BR-2
65.	NM-65	139.	NM-573	213.	NM-BR-3
66.	NM-66	140.	NM-57131	214.	NM-BR-4
67.	NM-67	141.	NM-57150	215.	NM-BR-5
68.	NM-68	142.	NM-55127	216.	NM-BR-6
69.	NM-69	143.	NM-5717	217.	NM-BR-7
70.	NM-70	144.	NM-57137	218.	NM-BR-8
71.	NM-71	145.	NM-57138	219.	NM-BR-9
72.	NM-72	146.	NM-0756	220.	NM-BR-10
73.	NM-73	147.	NM-8720	221.	NM-BR-11
74.	NM-74	148.	NM-8143		



EXPLANATION

SOURCES OF POTENTIAL AGGREGATE

BASIN-FILL DEPOSITS

Aaf	Stream Channel Deposits (A1)*
Asf	Santa Fe Group (A)
Aaf	Alluvial Fan Deposits (A5)
Au	Alluvial Deposits Undifferentiated (A)

ROCK UNITS

SYMBOLS

FUGRO NATIONAL FIELD STATIONS

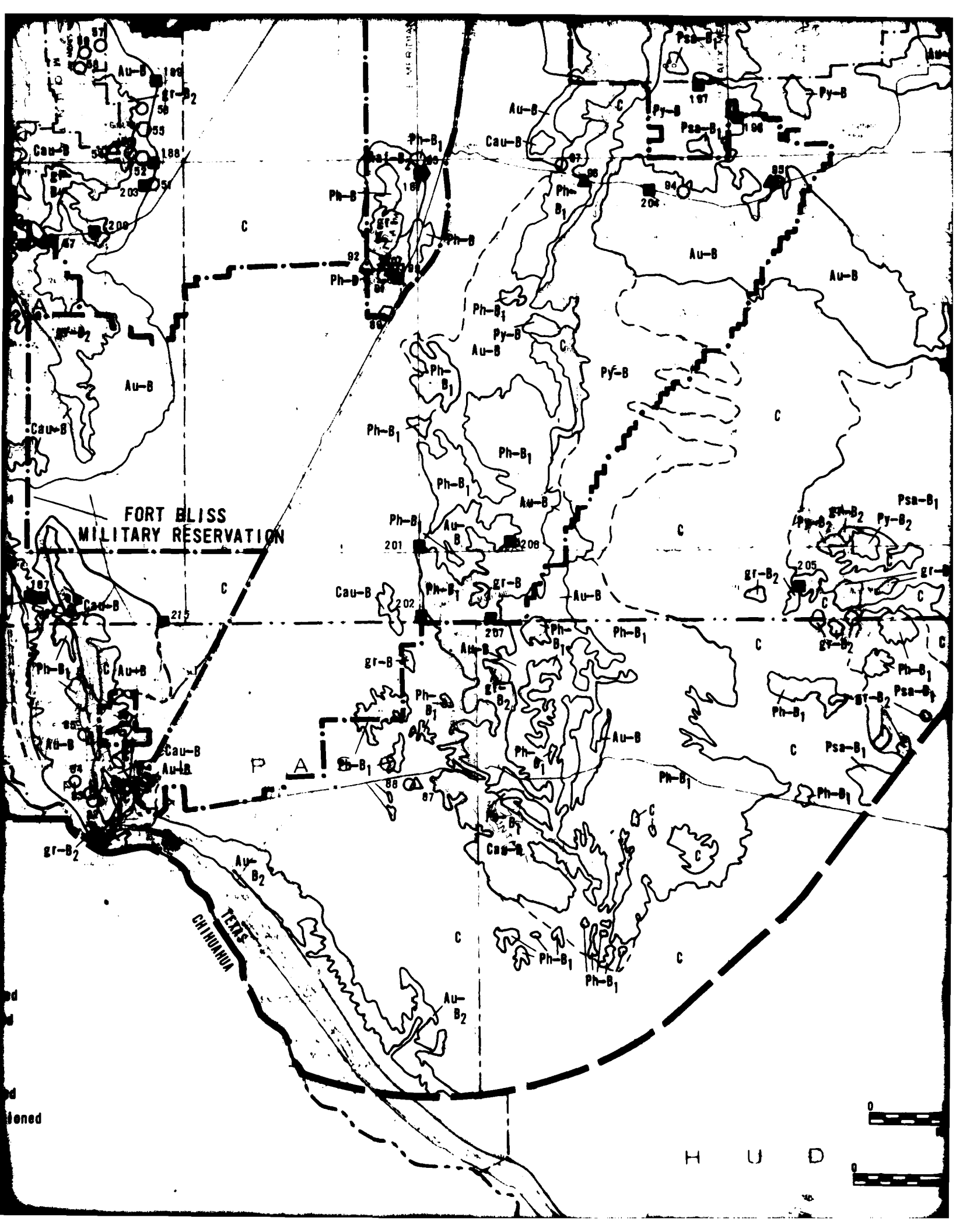
Basin-Fill Deposit

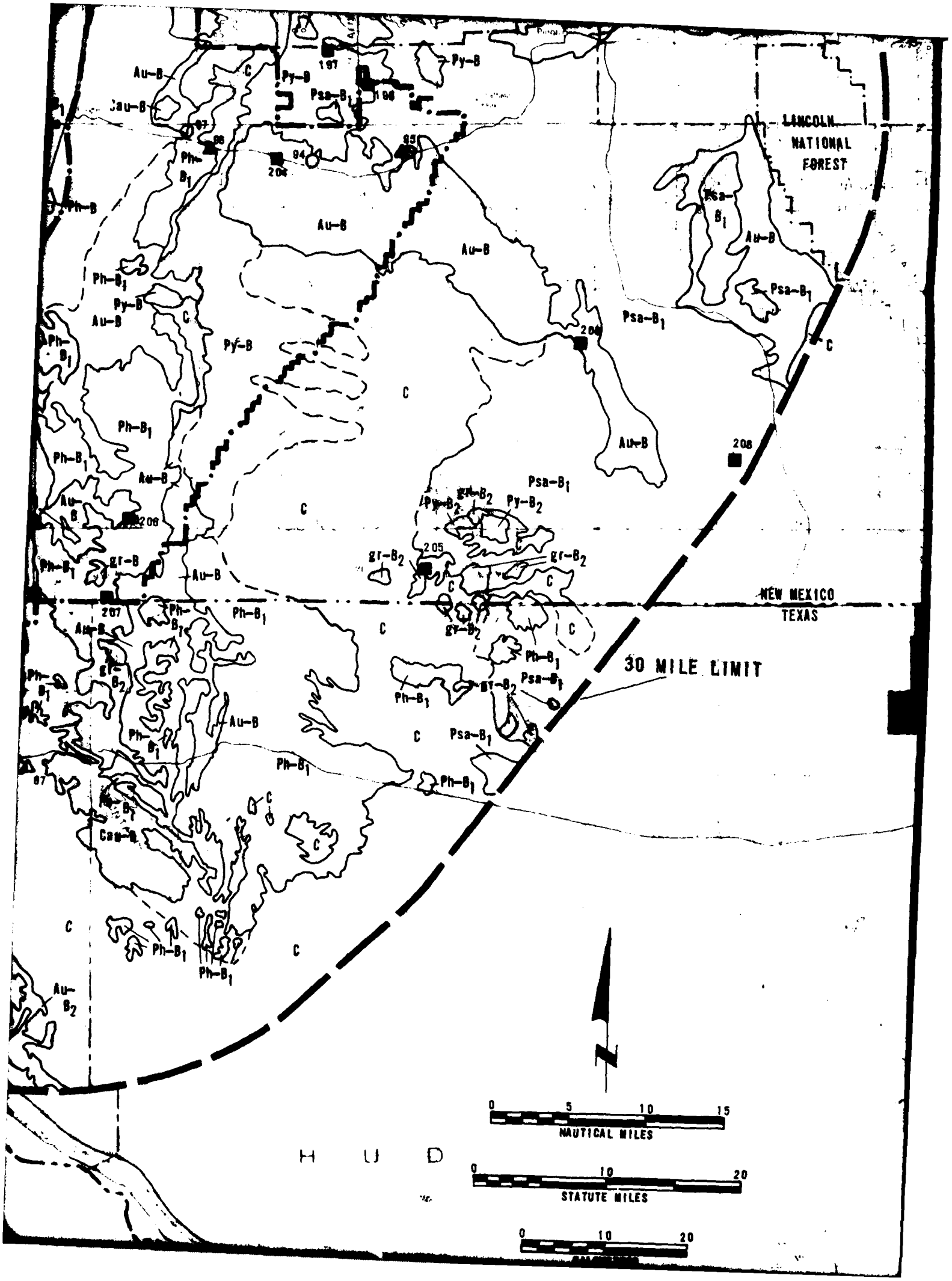
- ○ Data point, not sampled
- ◒ Sampled and not tested
- ● Sampled and tested

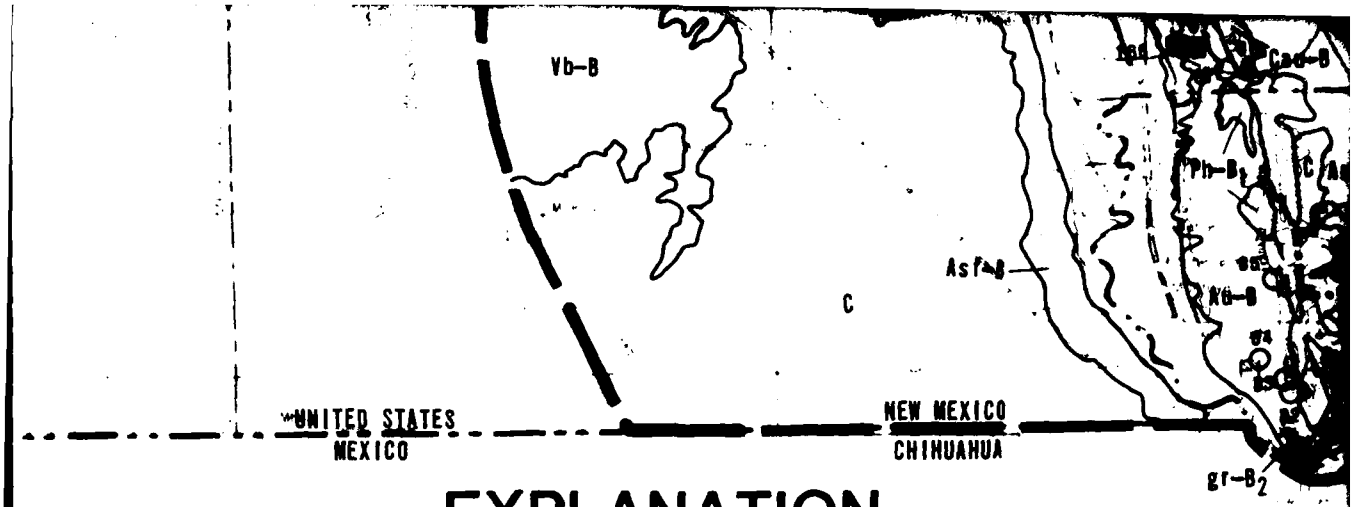
Rock Units

- △ Data point, not sampled
- ◬ Sampled and thin-sectioned
- ▲ Sampled and tested

Photo Step


FORT BLISS
MILITARY RESERVATION
TEXAS
CHIHUAHUA
Au-B
Cau-B
Ph-B
Ph-B1
Py-B
Psa-B1
gr-B2
Au-B2
C


LINCOLN NATIONAL FOREST
NEW MEXICO
TEXAS
30 MILE LIMIT
HUD
0 5 10 15
NAUTICAL MILES
0 10 20
STATUTE MILES
0 10 20



EXPLANATION

SOURCES OF POTENTIAL AGGREGATE

BASIN-FILL DEPOSITS

Aaf	Stream Channel Deposits (A1)*
Asf	Santa Fe Group (A)
Aaf	Alluvial Fan Deposits (A5)
Au	Alluvial Deposits Undifferentiated (A)

ROCK UNITS

Qtz	Quartzite (M)
Psa	San Andres Formation (S2)
Pm	Madera Limestone (S2)
Ph	Hueco Formation (S2)
Cau	Carbonate Rocks Undifferentiated (S2)
Py	Yeso Formation (S2)
Vb	Basalt (I2 and/or I3)
gr	Granitic Rocks (I2)
Vu	Volcanic Rock Undifferentiated (I)

*Reference Appendix G for symbol explanation and comparison.

SYMBOLS

FUGRO NATIONAL FIELD STATIONS

Basin-Fill Deposit

- ○ Data point, not sampled
- ◒ Sampled and not tested
- ● Sampled and tested

Rock Units

- △ Data point, not sampled
- ◬ Sampled and thin-sectioned
- ▲ Sampled and tested

Photo Stop

- ⬡ Photograph only

EXISTING BORROW PIT OR QUARRY

- ■ Test data available

MATERIAL TYPE - RANKING

- Cau-B See Ranking System below

GEOLOGIC CONTACT

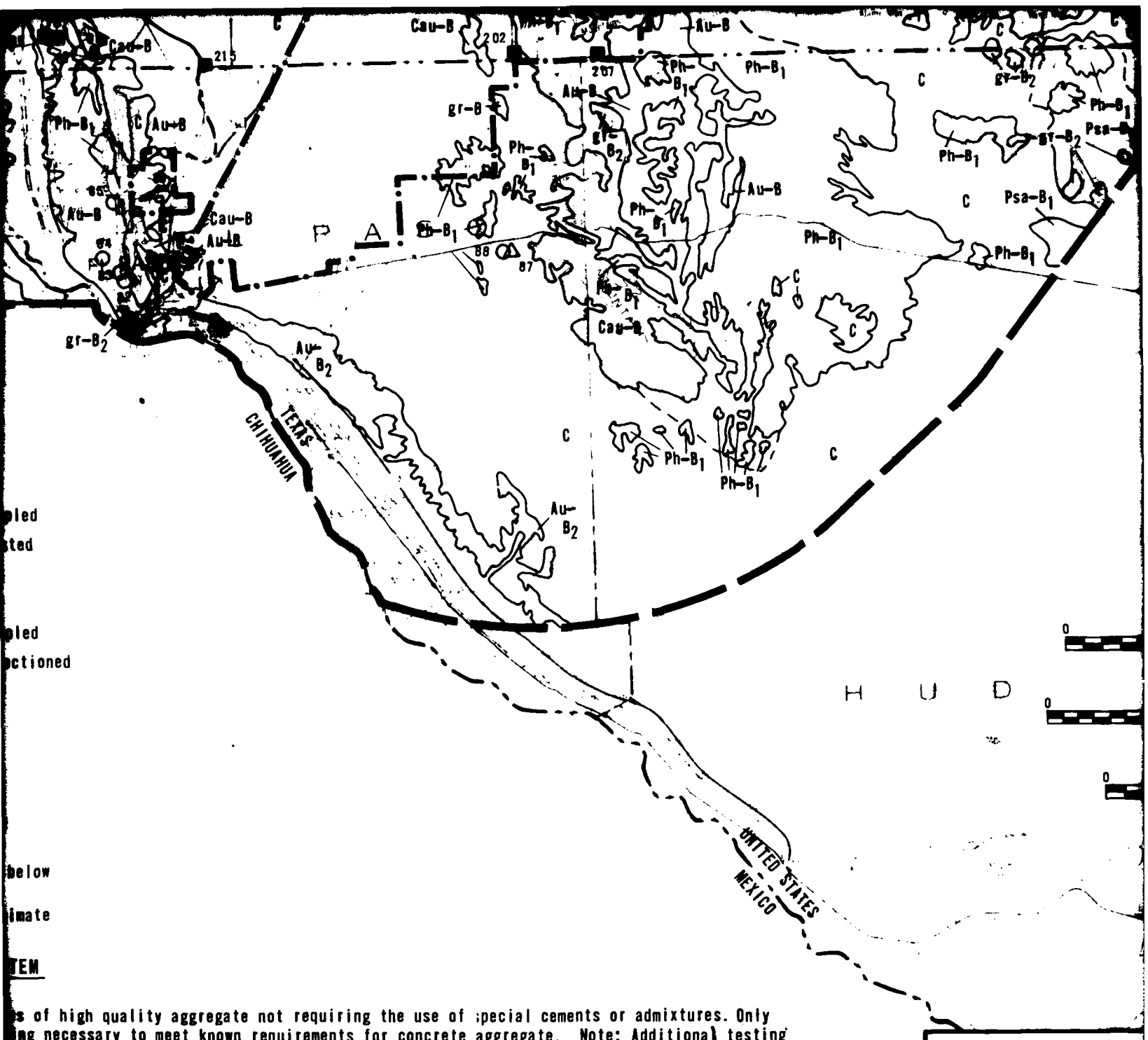
- ~ Dashed where approximate

RANKING SYSTEM

A CLASS A: Potential sources of high quality nominal processing necessary to and case history studies needed

B CLASS B: Potential sources of concrete ag of poorer quality than Class A a aggregate suitability and proba divided into subunits B_1 and B_2 concrete aggregate. B_2 materia *which may make it marginal for*

C CLASS C: Material considered undesireabl



pled
ted

pled
ctioned

below

imate

TEM

s of high quality aggregate not requiring the use of special cements or admixtures. Only ng necessary to meet known requirements for concrete aggregate. Note: Additional testing y studies needed to confirm adequacy and define exact characteristics of material.

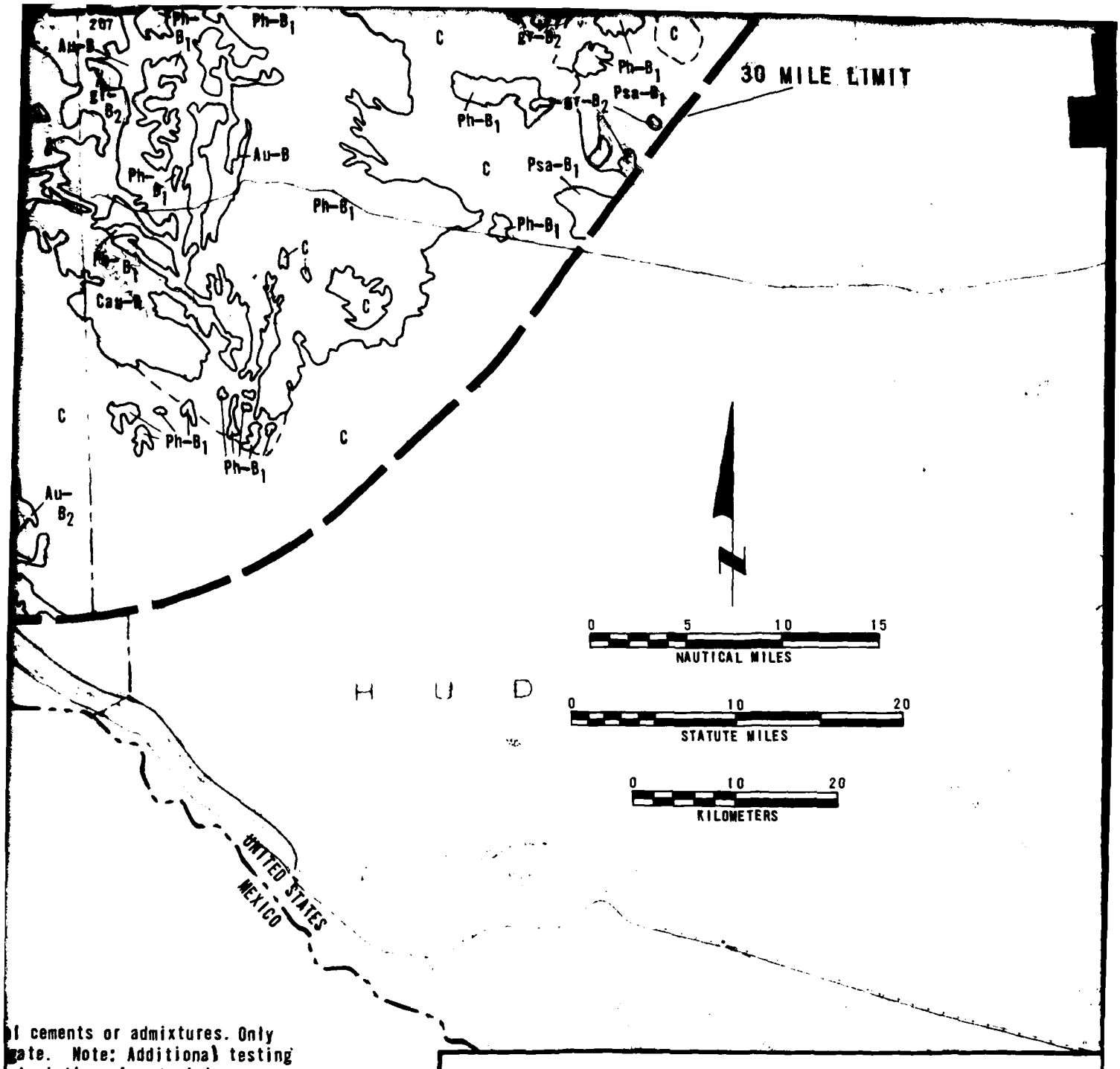
s of concrete aggregate exhibiting one or more undesireable characteristics which make it y than Class A aggregate. Detailed investigation would be required to accurately define ility and probable concrete characteristics. Where possible this class of material was units B_1 and B_2. Materials classified as B_1 are considered to be generally adequate for te. B_2 material is considered to be probably suitable but has several characteristics t marginal for use as a concrete aggregate.

red undesireable for use as concrete aggregate.

NEW MEXICO-T

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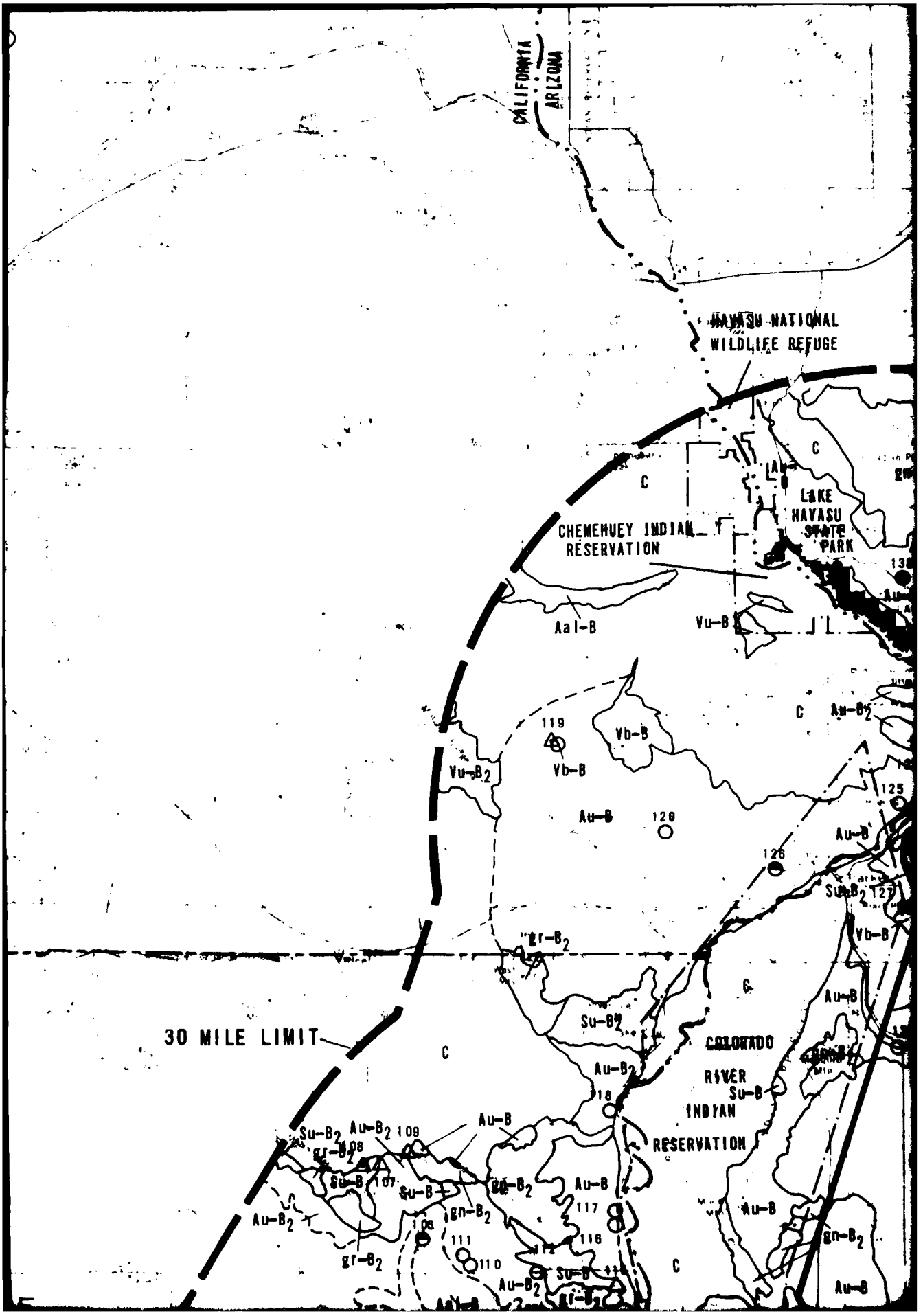
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has several characteristics

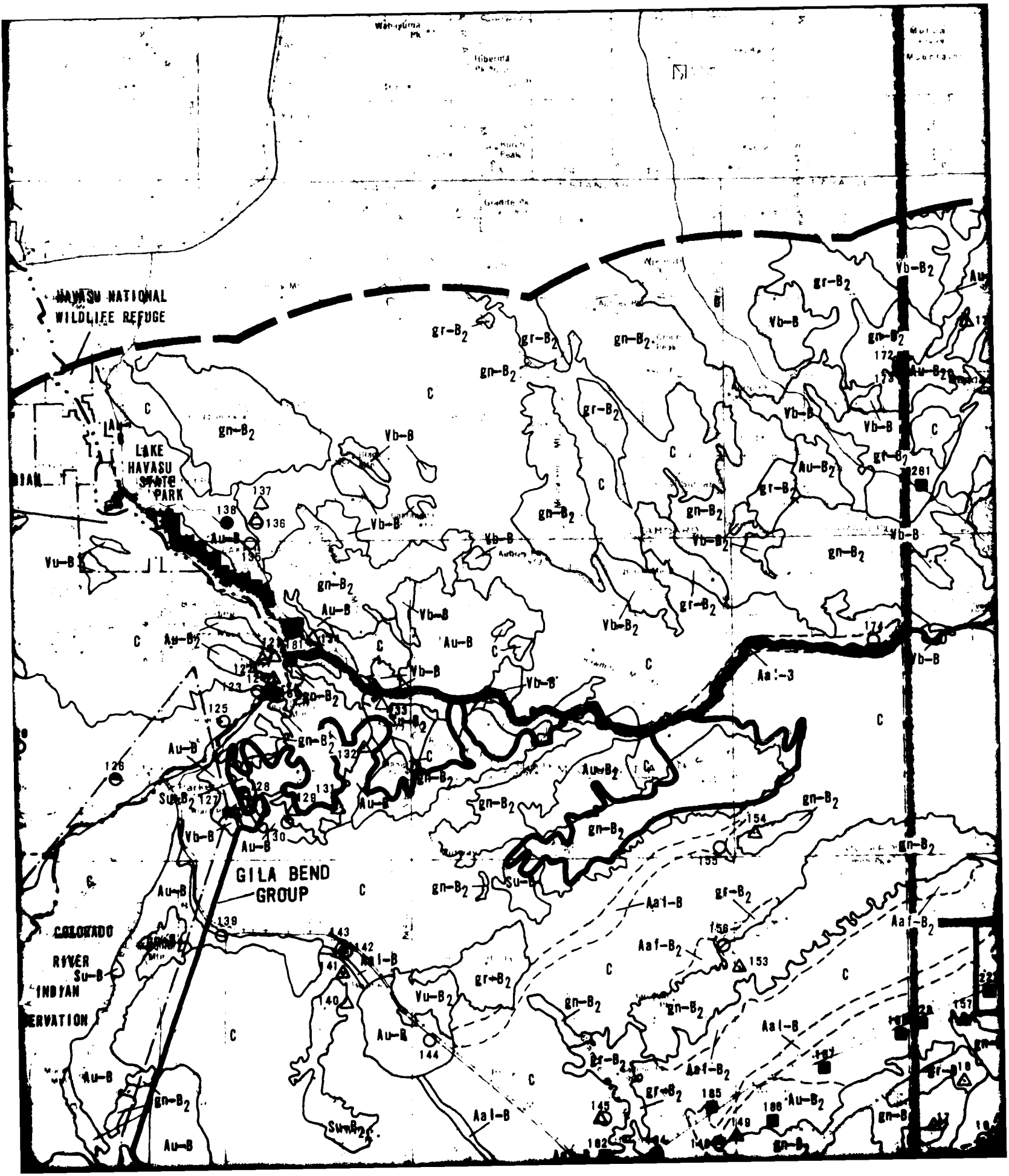
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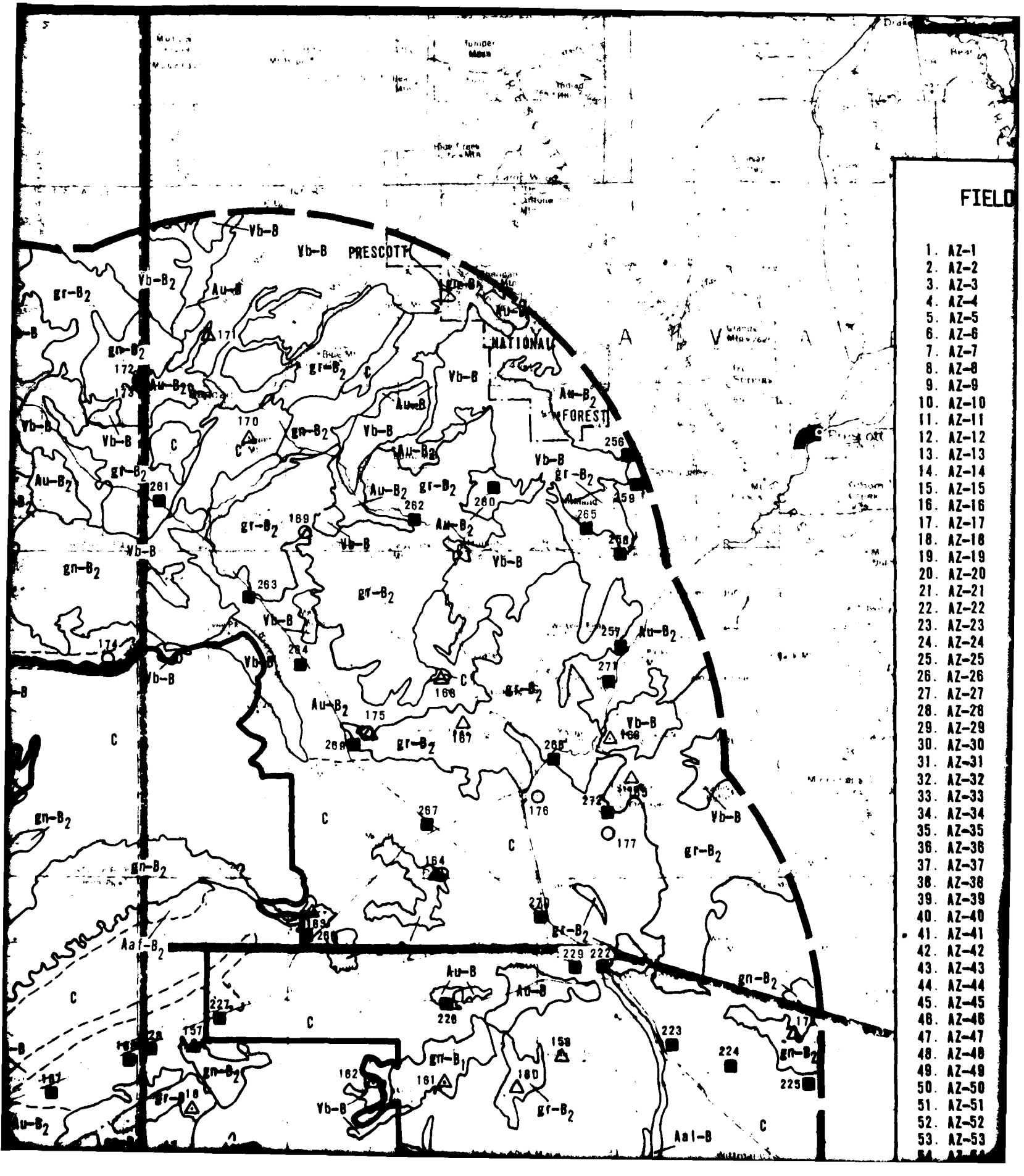
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DEPARTMENT OF THE AIR FORCE - SAMSO

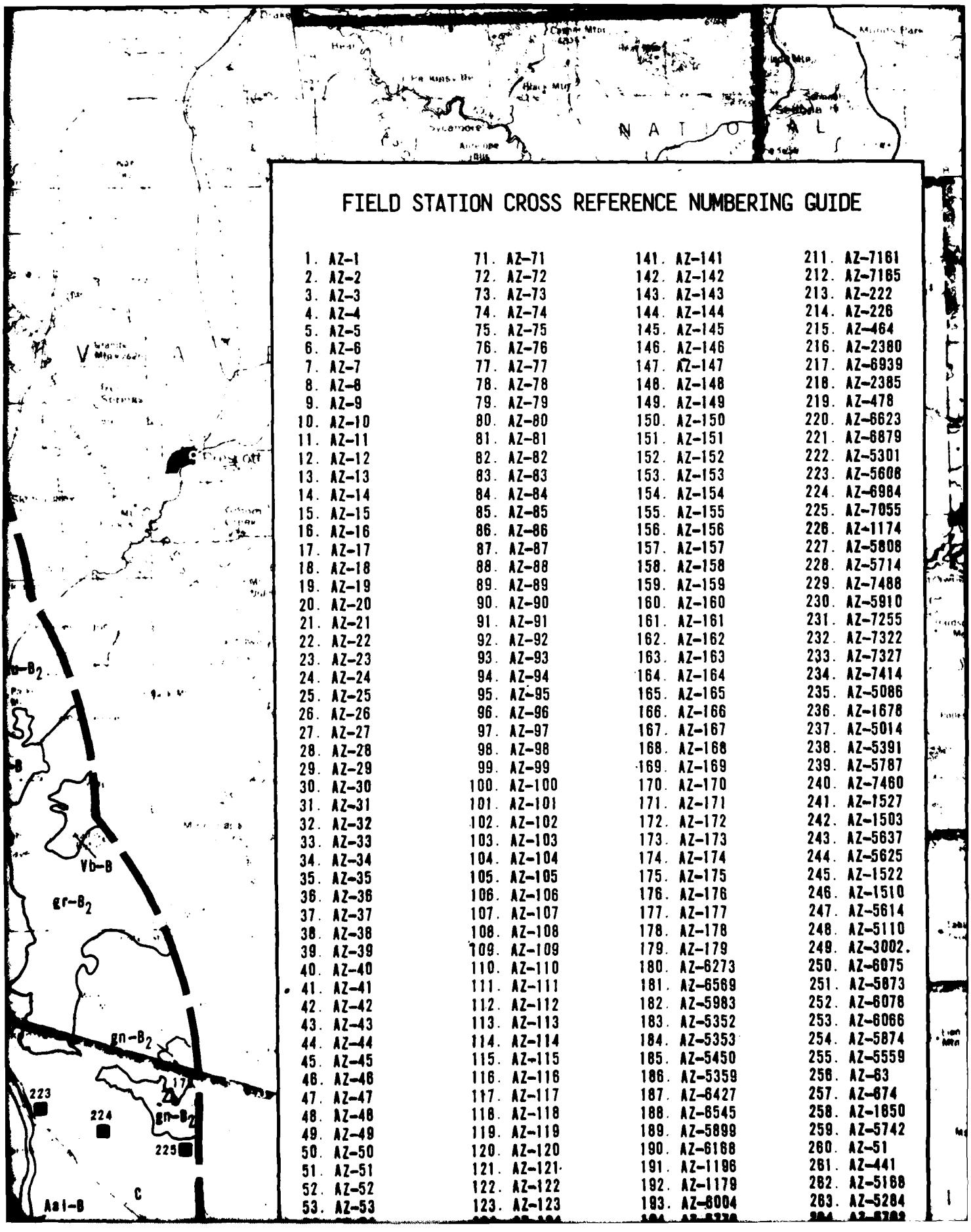
DRAWING
5.1-A

FUGRO NATIONAL, INC.


CALIFORNIA
ARIZONA
HAVASU NATIONAL
WILDLIFE REFUGE
LAKE
HAVASU
STATE
PARK
CHEMEHUEY INDIAN
RESERVATION
30 MILE LIMIT
COLORADO
RIVER
INDIAN
RESERVATION
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Vu-B
Vb-B
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Au-B2
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gr-B2
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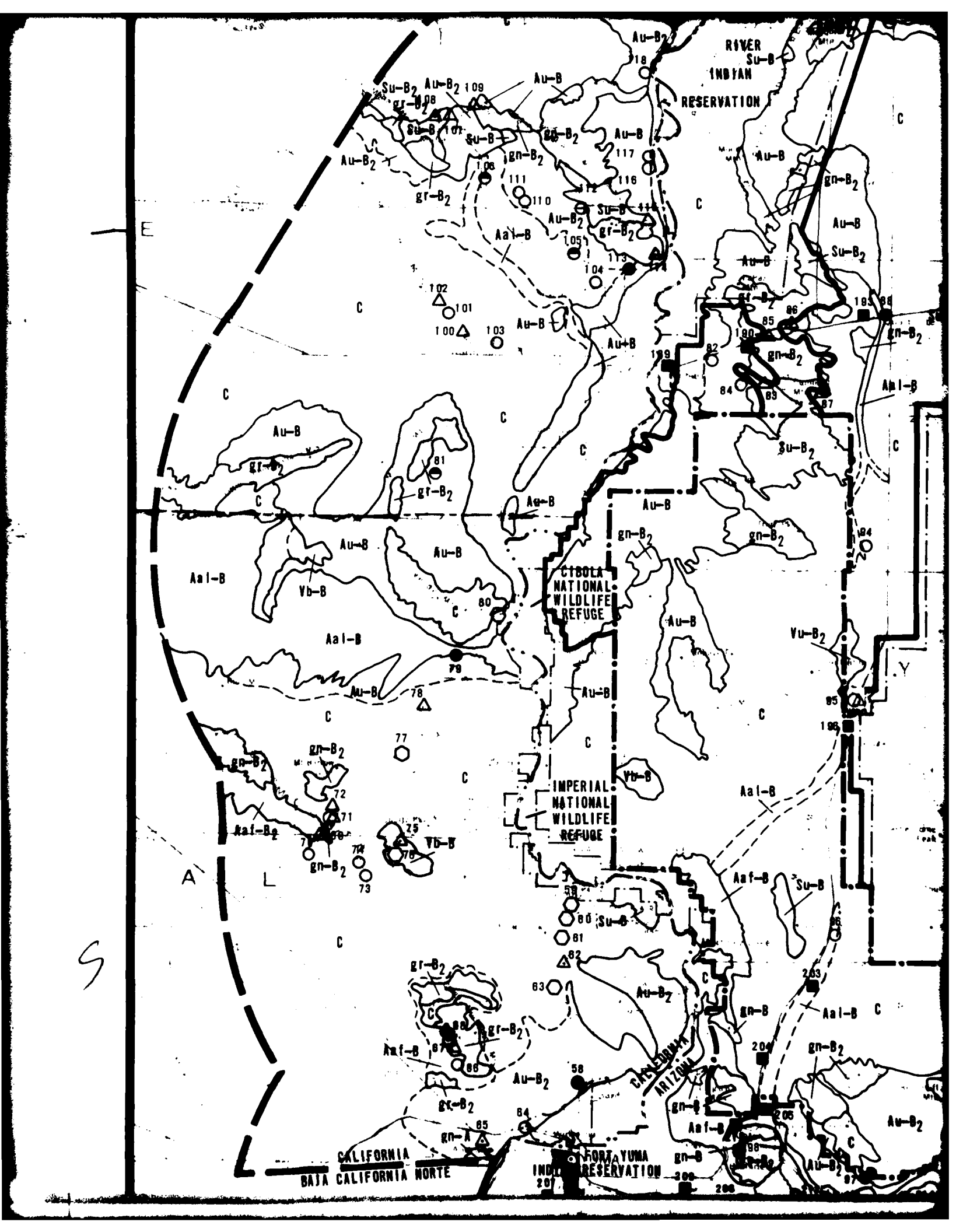

HAVASU NATIONAL WILDLIFE REFUGE
LAKE HAVASU STATE PARK
GILA BEND GROUP
COLORADO RIVER INDIAN RESERVATION
gn-B2
gr-B2
Vb-B
Au-B
Au-B2
Vu-B
Vb-B2
Su-B2
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Aal-B
C

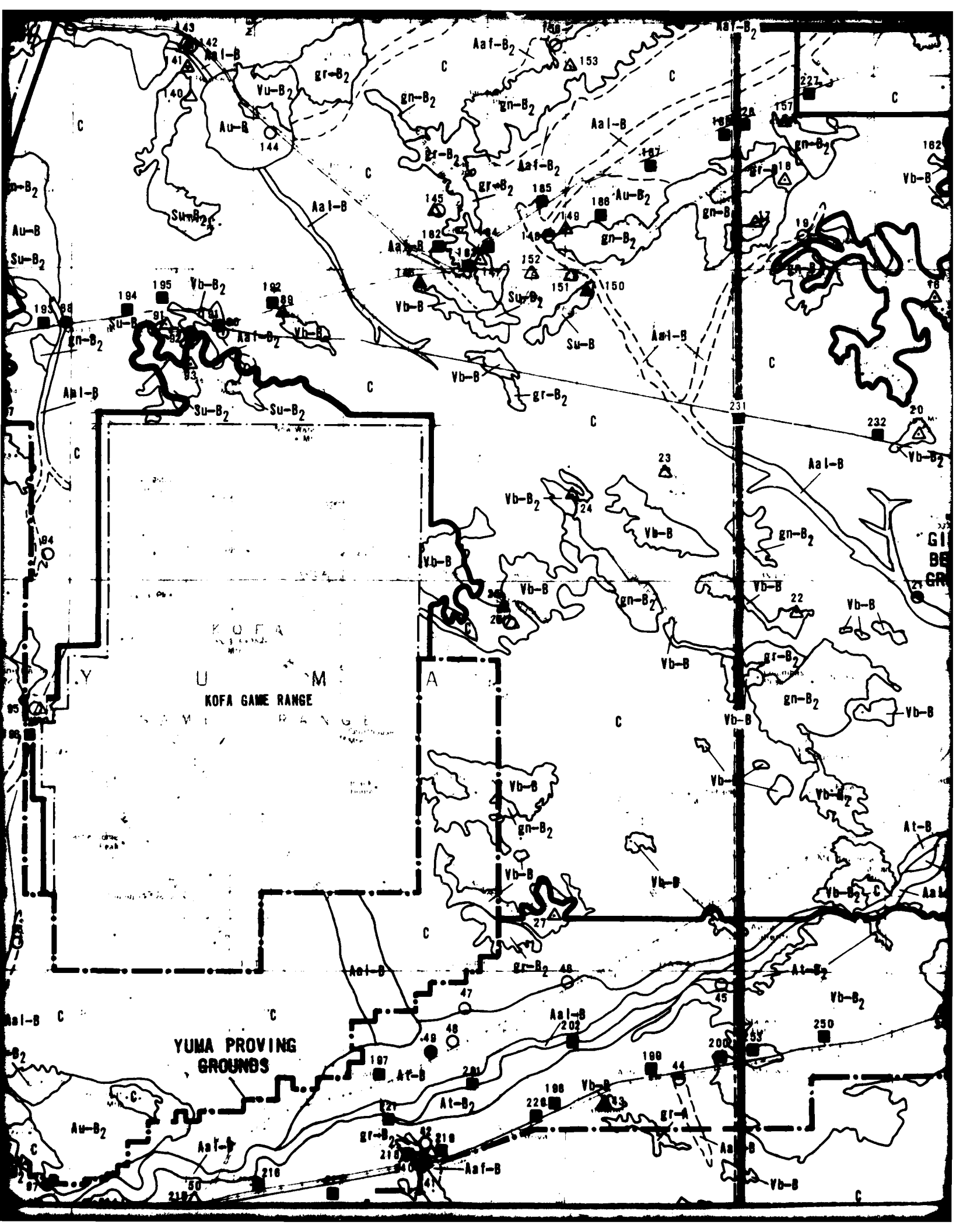

PRESCOTT
NATIONAL
FOREST
FIELD
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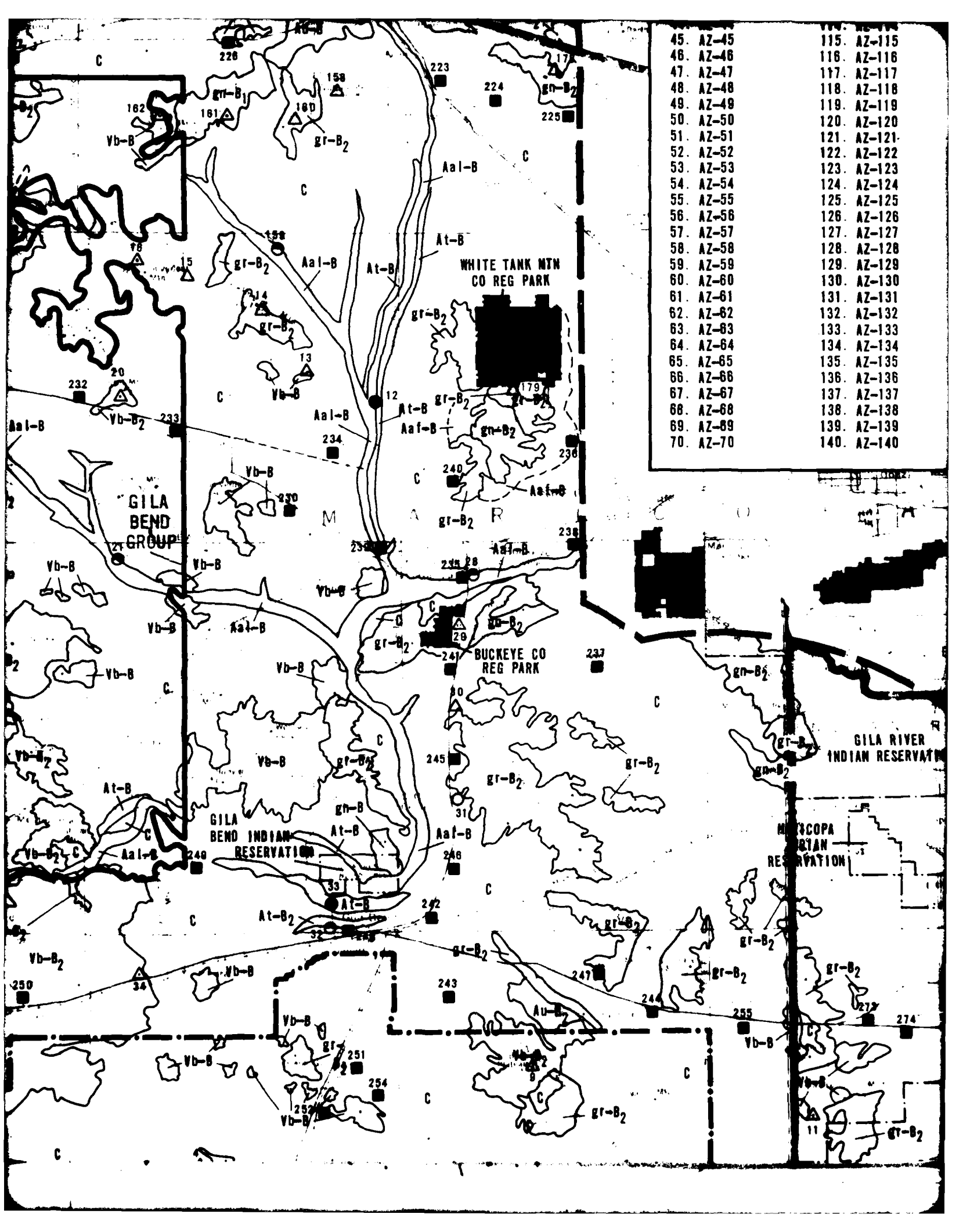


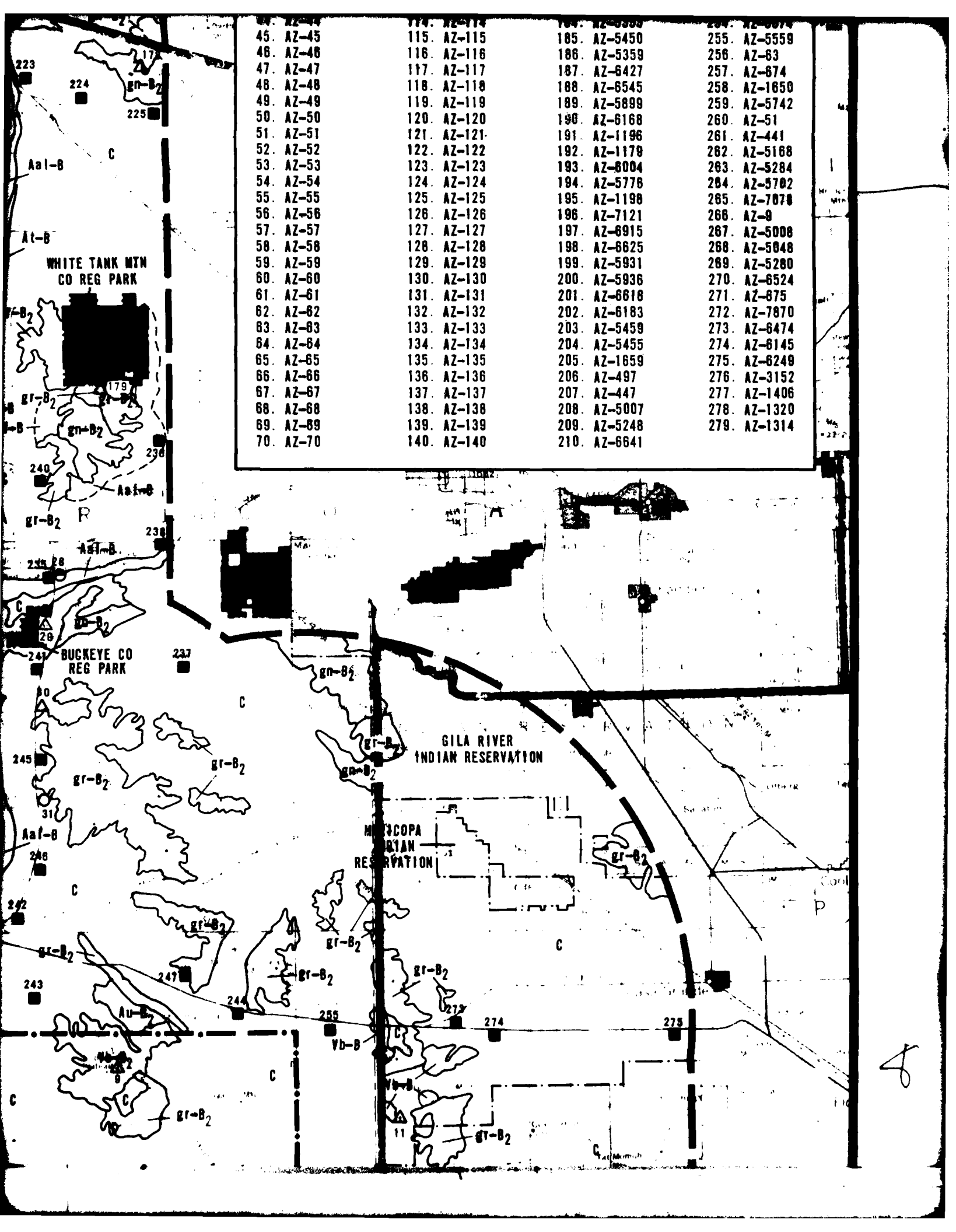
FIELD STATION CROSS REFERENCE NUMBERING GUIDE

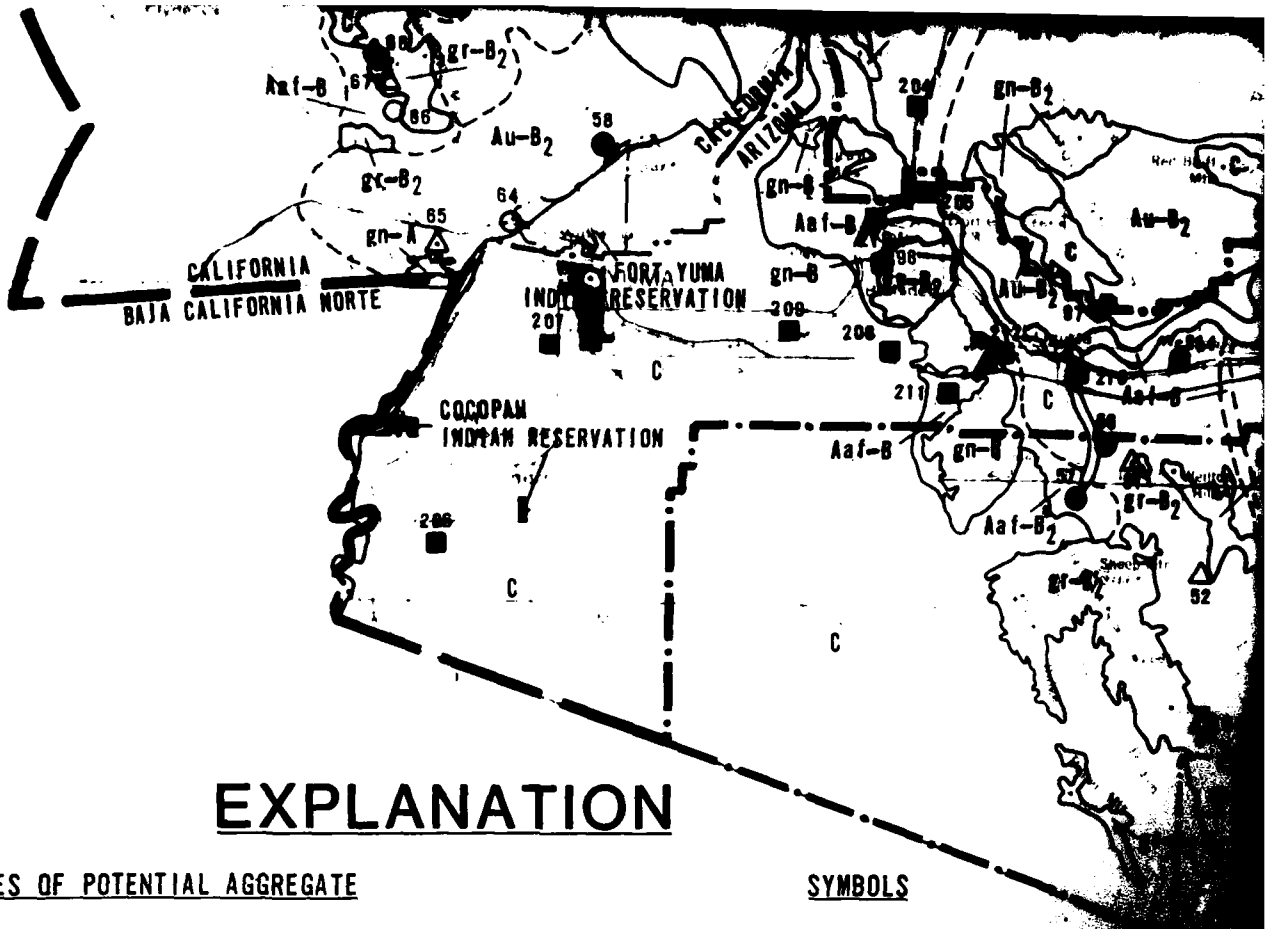
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RIVER INDIAN RESERVATION
CIBOLA NATIONAL WILDLIFE REFUGE
IMPERIAL NATIONAL WILDLIFE REFUGE
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BAJA CALIFORNIA NORTE
ARIZONA
FORT YUMA INDIAN RESERVATION
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Au-B2
Su-B
Su-B2
gn-B2
gr-B2
Aal-B
Aaf-B
Vb-B
Vu-B2
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KOFA GAME RANGE
YUMA PROVING GROUNDS


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GILA BEND GROUP
BUCKEYE CO REG PARK
GILA BEND INDIAN RESERVATION
GILA RIVER INDIAN RESERVATION
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Aaf-B
Vb-B
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WHITE TANK MTN CO REG PARK
BUCKEYE CO REG PARK
GILA RIVER INDIAN RESERVATION
Aal-B
At-B
Au-B
Vb-B
gr-B2
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R
P



EXPLANATION

SOURCES OF POTENTIAL AGGREGATE

BASIN-FILL DEPOSITS

- Aal — Stream Channel Deposits (A1)*
- At — River Terrace Deposits (A2)
- Aaf — Alluvial Fan Deposits (A5)
- Au — Alluvial Deposits Undifferentiated (A)

ROCK UNITS

- Vb — Basalt (I2 and/or I3)
- gr — Granitic Rocks (I2)
- gn — Gneiss and Associated Metamorphic Rocks (M)
- Su — Sedimentary Rock Undifferentiated (S)

*Reference Appendix G for symbol explanation and comparison.

SYMBOLS

FUGRO NATIONAL FIELD STATIONS

Basin-Fill Deposits

- ○ Data point, not sampled
- ◒ Sampled and not tested
- ● Sampled and tested

Rock Units

- △ Data point, not sampled
- ◬ Sampled and thin-sectioned
- ▲ Sampled and tested

Photo Stop

- ⬡ Photograph only

EXISTING BORROW PIT OR QUARRY

- ■ Test data available

MATERIAL TYPE-RANKING

- $gr-B_2$ See Ranking System below

GEOLOGIC CONTACT

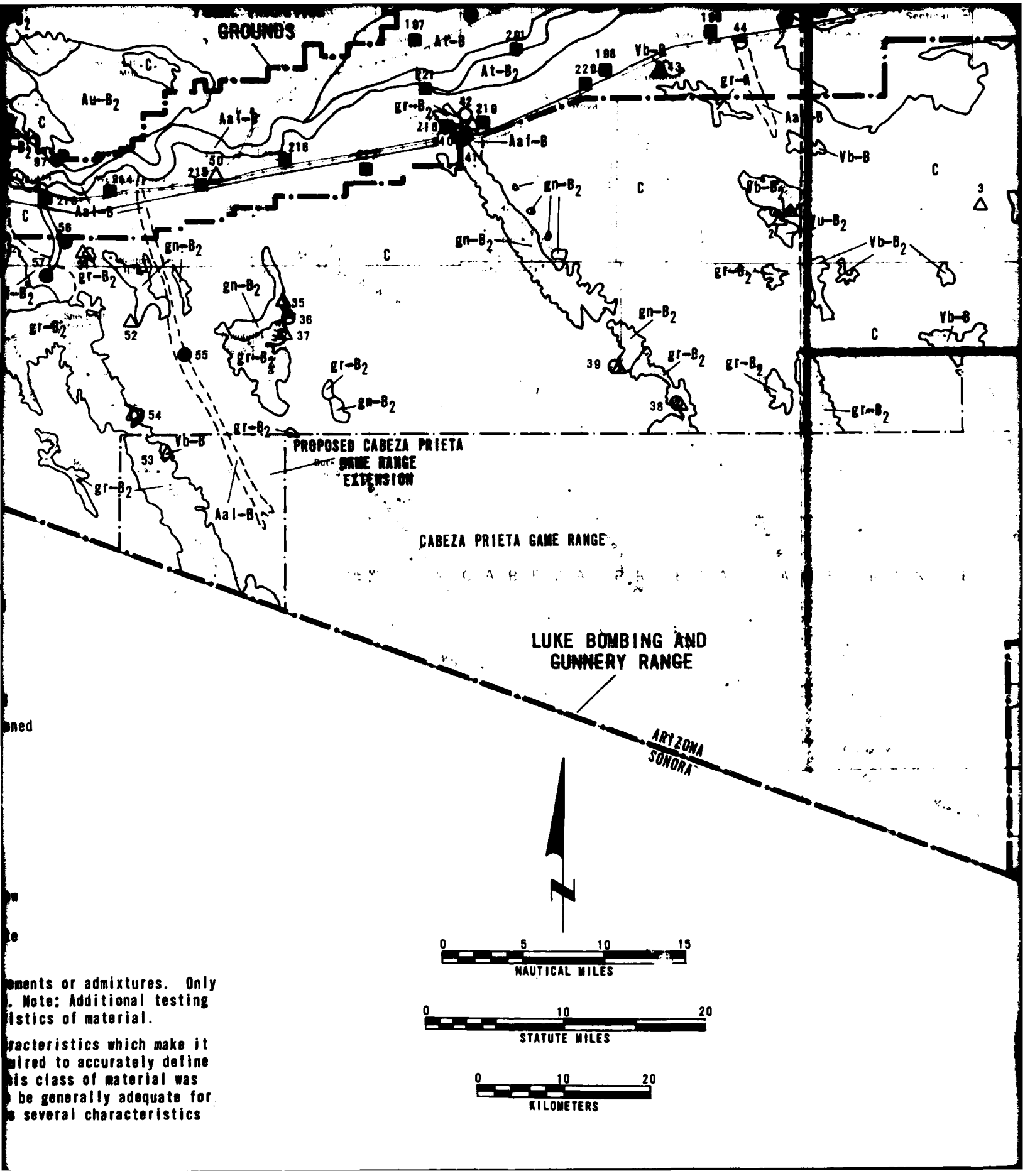
- ~ – Dashed where approximate

RANKING SYSTEM

A CLASS A: Potential sources of high quality aggregate not requiring the use of special cements or [illegible] nominal processing necessary to meet known requirements for concrete aggregate. Note: Additional [illegible] and case history studies needed to confirm adequacy and define exact characteristics of material.

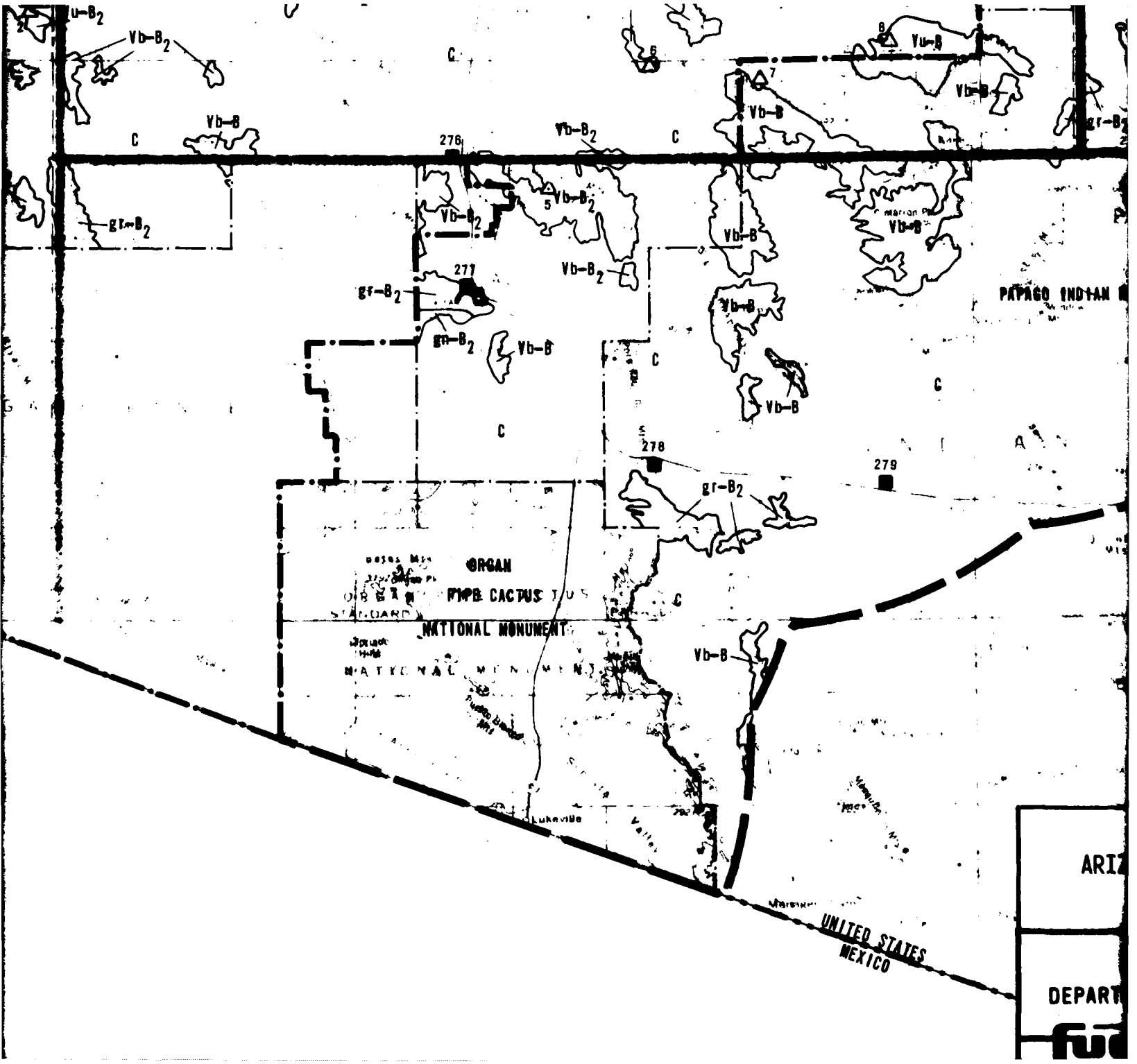
B CLASS B: Potential sources of concrete aggregate exhibiting one or more undesireable characteristics which m[illegible] of poorer quality than Class A aggregate. Detailed investigation would be required to accurately d[illegible] aggregate suitability and probable concrete characteristics. Where possible this class of material is divided into subunits B_1 and B_2. Materials classified as B_1 are considered to be generally adequate concrete aggregate. B_2 material is considered to be probably suitable but has several characteristics which may make it marginal for use as a concrete aggregate.

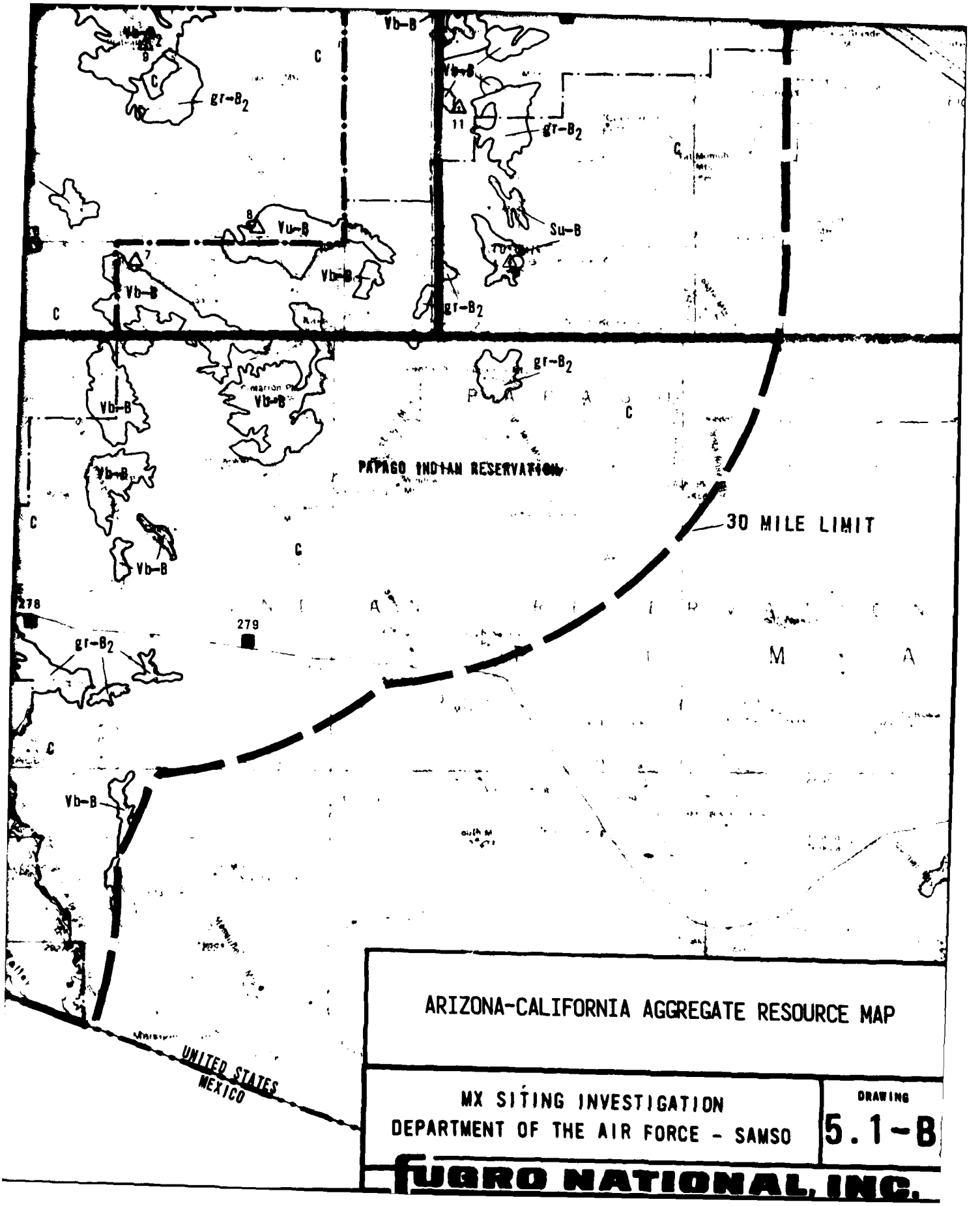
C CLASS C: Material considered undesireable for use as concrete aggregate.



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. Note: Additional testing
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gr-B2
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ORGAN
PIPE CACTUS
NATIONAL MONUMENT
UNITED STATES
MEXICO
ARI
DEPART



ARIZONA-CALIFORNIA AGGREGATE RESOURCE MAP

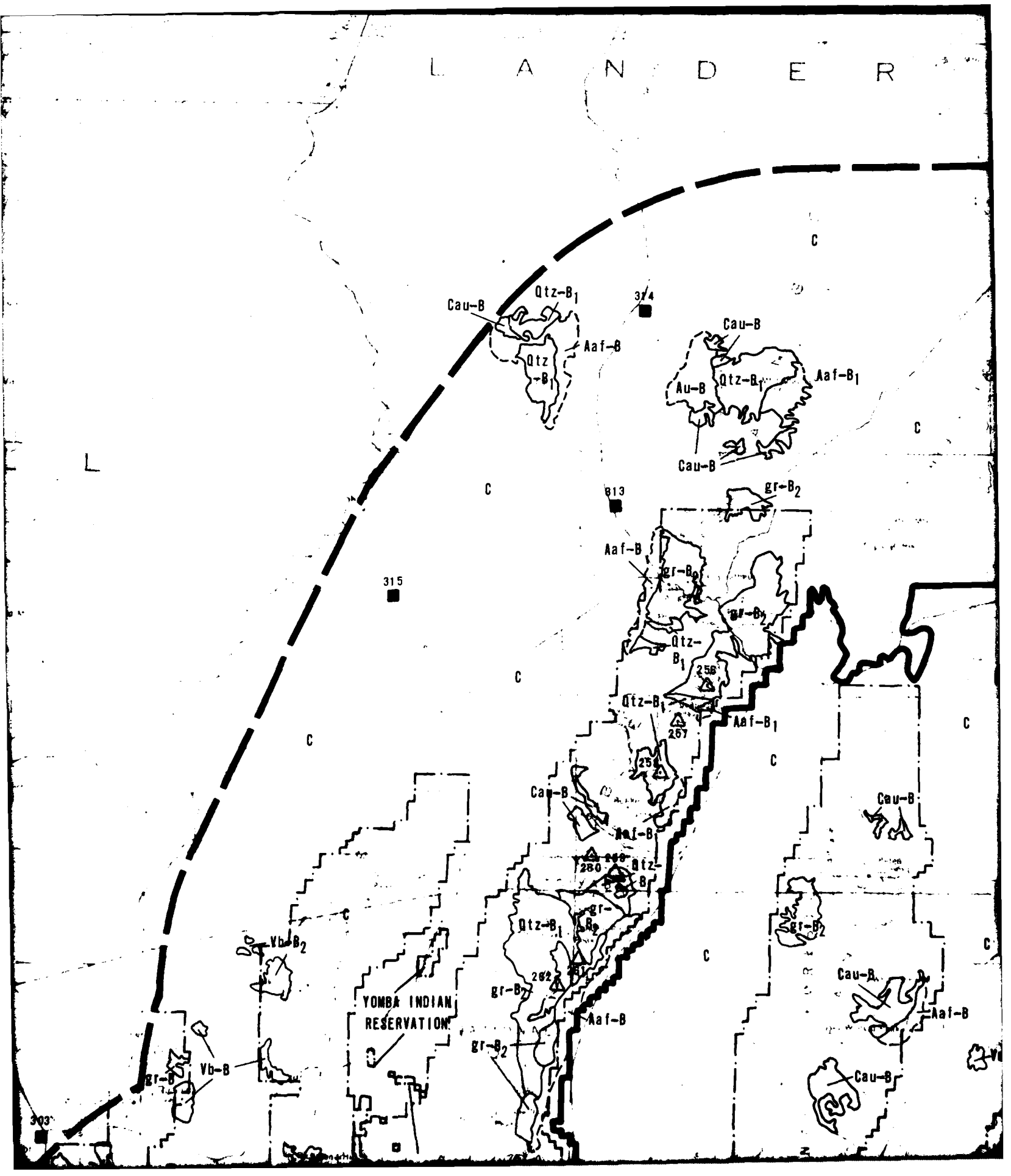
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

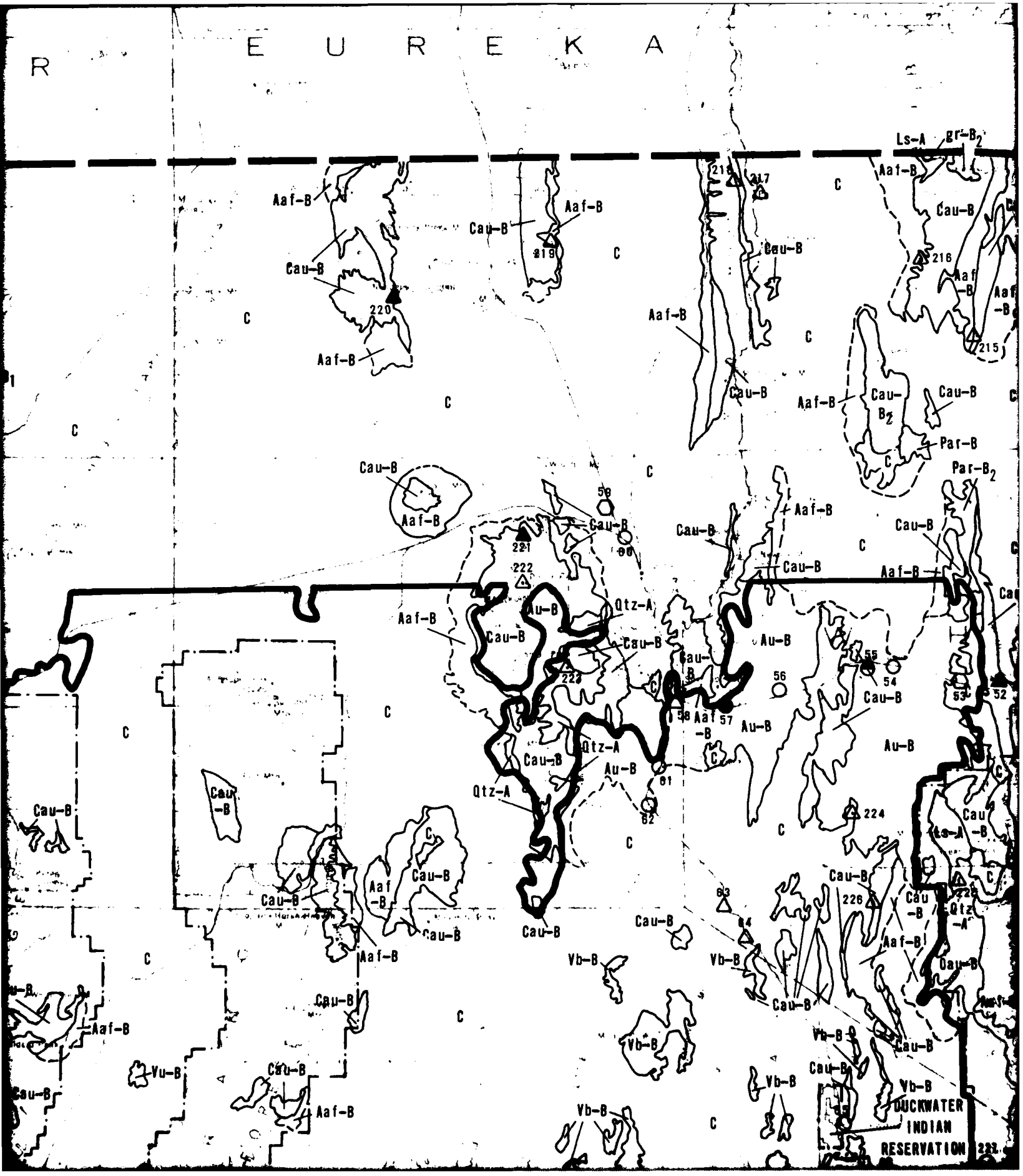
DRAWING
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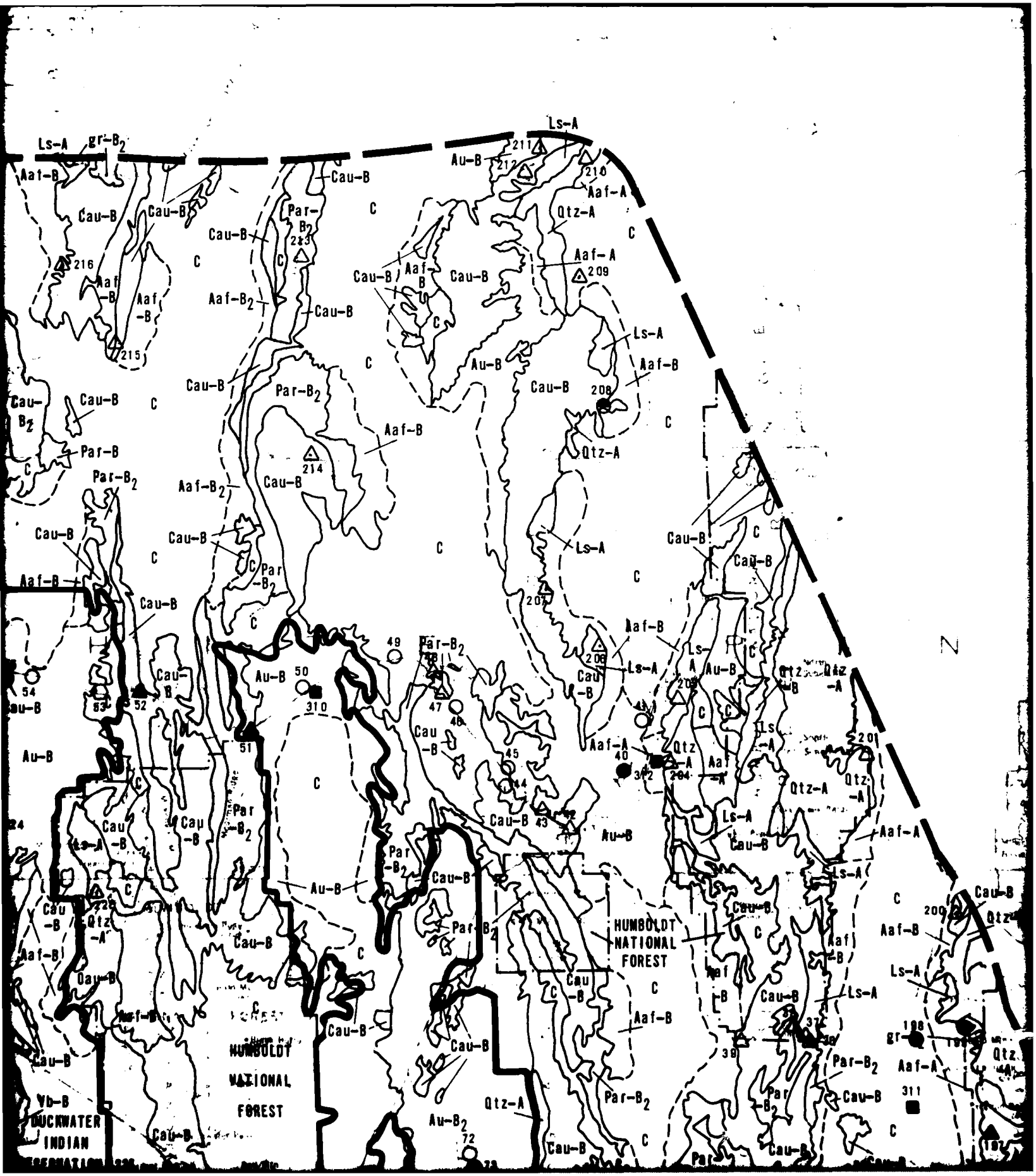
FUGRO NATIONAL, INC.

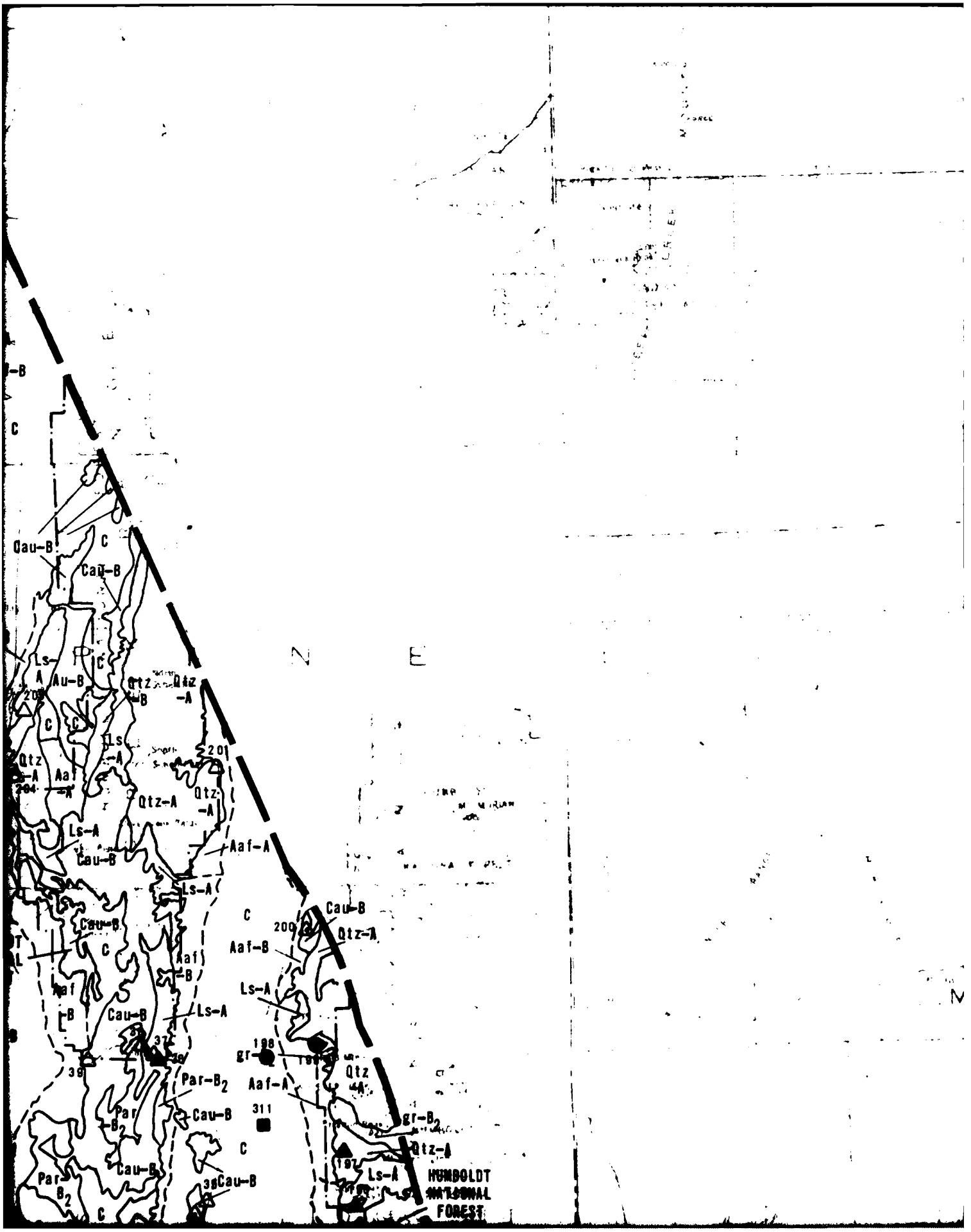
FIELD STATION CROSS REFERENCE NUMBERING GUIDE

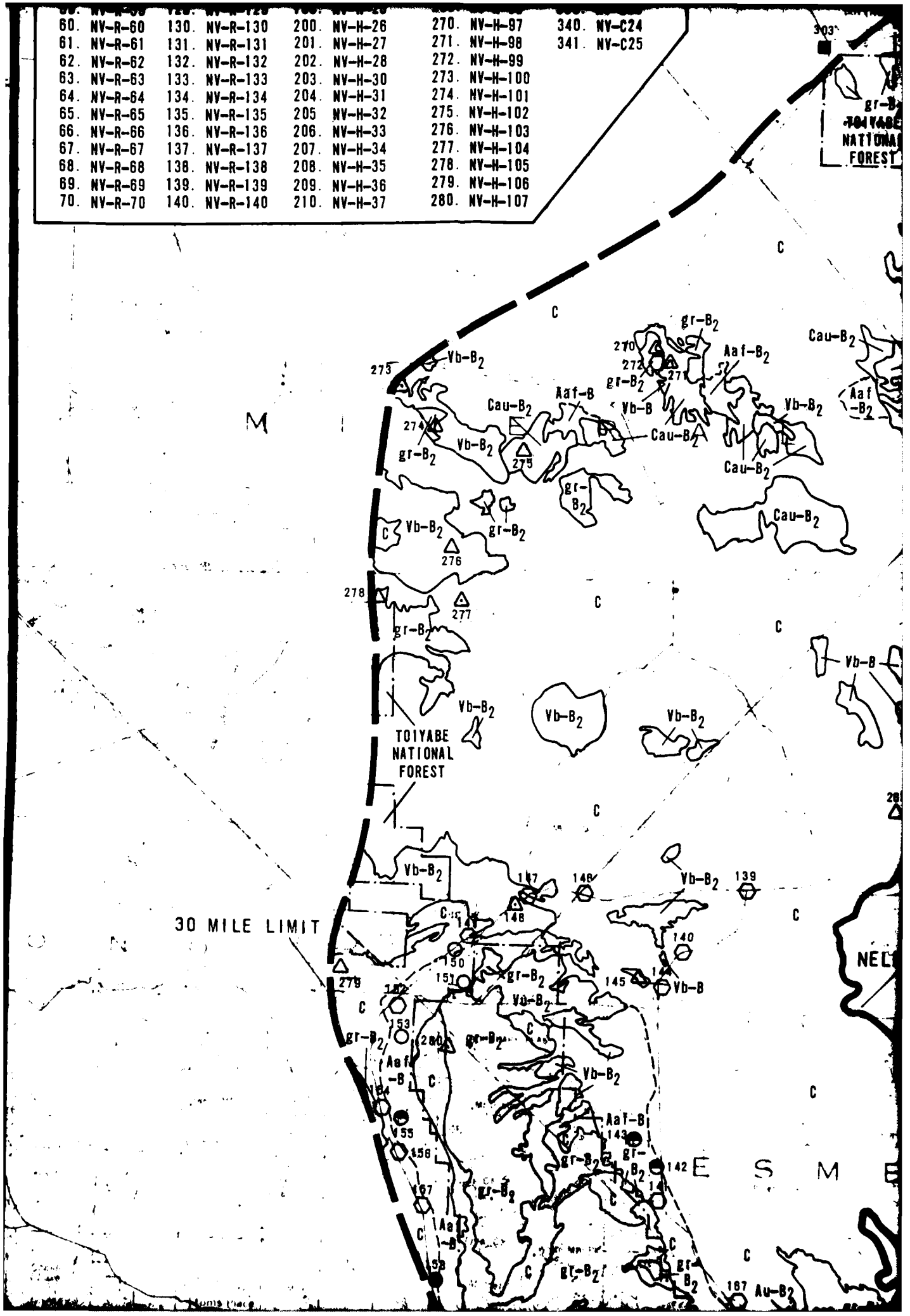
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26. NV-R-26	96. NV-R-96	166. NV-R-166	236. NV-H-63	306. NV-N-6
27. NV-R-27	97. NV-R-97	167. NV-R-167	237. NV-H-64	307. NV-N-7
28. NV-R-28	98. NV-R-98	168. NV-R-168	238. NV-H-65	308. NV-N-8
29. NV-R-29	99. NV-R-99	169. NV-R-169	239. NV-H-66	309. NV-N-9
30. NV-R-30	100. NV-R-100	170. NV-R-170	240. NV-H-67	310. NV-W-1
31. NV-R-31	101. NV-R-101	171. NV-R-171	241. NV-H-68	311. NV-W-2
32. NV-R-32	102. NV-R-102	172. NV-R-172	242. NV-H-69	312. NV-W-4
33. NV-R-33	103. NV-R-103	173. NV-R-173	243. NV-H-70	313. NV-LAN-1
34. NV-R-34	104. NV-R-104	174. NV-R-174	244. NV-H-71	314. NV-LAN-2
35. NV-R-35	105. NV-R-105	175. NV-H-1	245. NV-H-72	315. NV-LAN-3
36. NV-R-36	106. NV-R-106	176. NV-H-2	246. NV-H-73	316. NV-C10
37. NV-R-37	107. NV-R-107	177. NV-H-3	247. NV-H-74	317. NV-C1
38. NV-R-38	108. NV-R-108	178. NV-H-4	248. NV-H-75	318. NV-C3
39. NV-R-39	109. NV-R-109	179. NV-H-5	249. NV-H-76	319. NV-C7
40. NV-R-40	110. NV-R-110	180. NV-H-6	250. NV-H-77	320. NV-LN1
41. NV-R-41	111. NV-R-111	181. NV-H-7	251. NV-H-78	321. NV-LN2
42. NV-R-42	112. NV-R-112	182. NV-H-8	252. NV-H-79	322. NV-LN4
43. NV-R-43	113. NV-R-113	183. NV-H-9	253. NV-H-80	323. NV-LN5
44. NV-R-44	114. NV-R-114	184. NV-H-10	254. NV-H-81	324. NV-LN6
45. NV-R-45	115. NV-R-115	185. NV-H-11	255. NV-H-82	325. NV-LN7
46. NV-R-46	116. NV-R-116	186. NV-H-12	256. NV-H-83	326. NV-C26
47. NV-R-47	117. NV-R-117	187. NV-H-13	257. NV-H-84	327. NV-C27
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61. NV-R-61	131. NV-R-131	201. NV-H-27	271. NV-H-98	341. NV-C25
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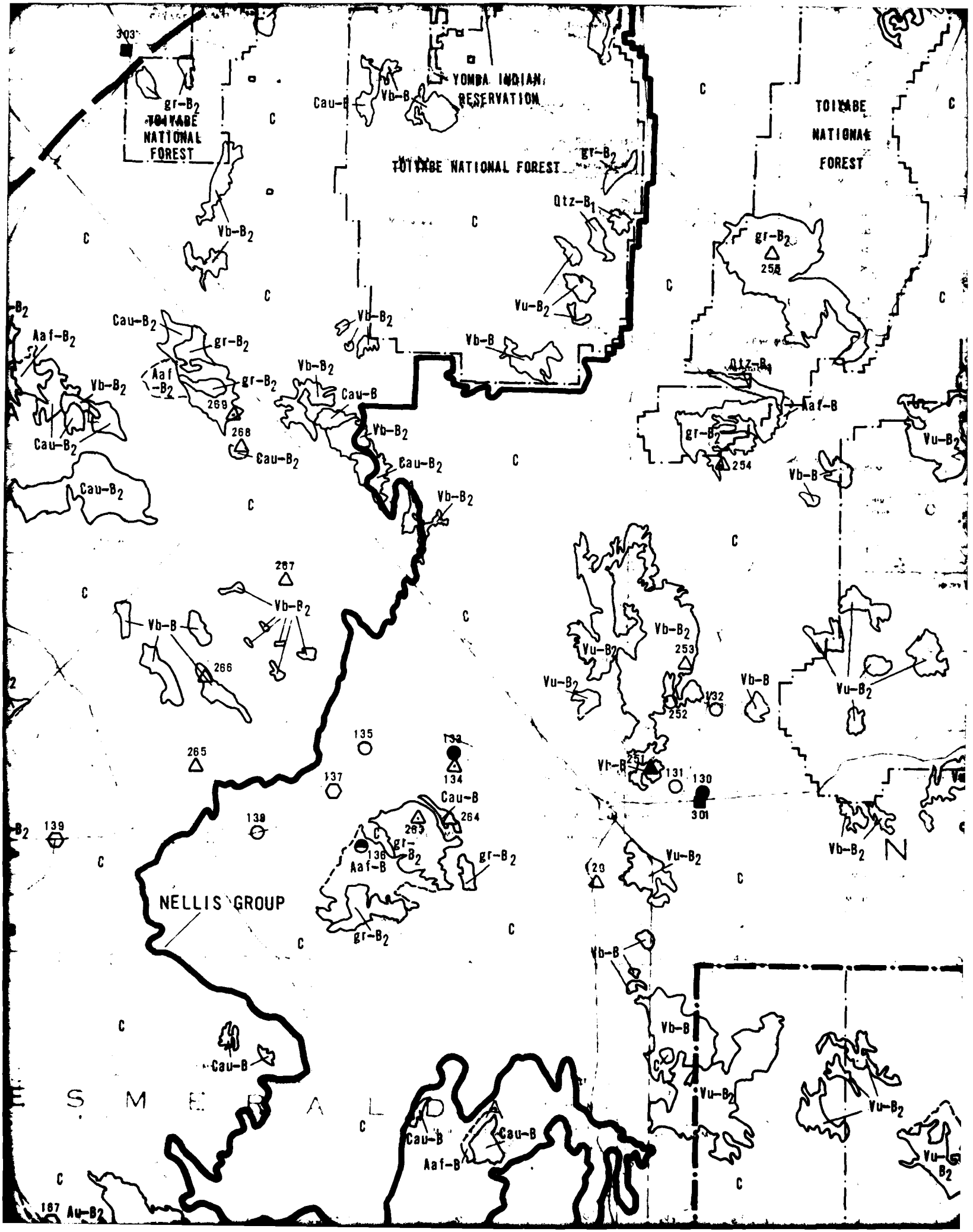

L A N D E R
Cau-B
Qtz-B1
Aaf-B
Qtz-B1
314
Cau-B
Au-B
Qtz-B1
Aaf-B1
Cau-B
C
L
C
813
gr-B2
Aaf-B
gr-B2
315
gr-B2
Qtz-B1
256
Qtz-B1
Aaf-B1
267
C
C
C
Cau-B
Aaf-B
Cau-B
280
Qtz-B1
gr-B2
Qtz-B1
gr-B2
Vb-B2
C
C
262
gr-B2
Cau-B
Aaf-B
YOMBA INDIAN RESERVATION
gr-B2
Vb-B
gr-B
Cau-B
303

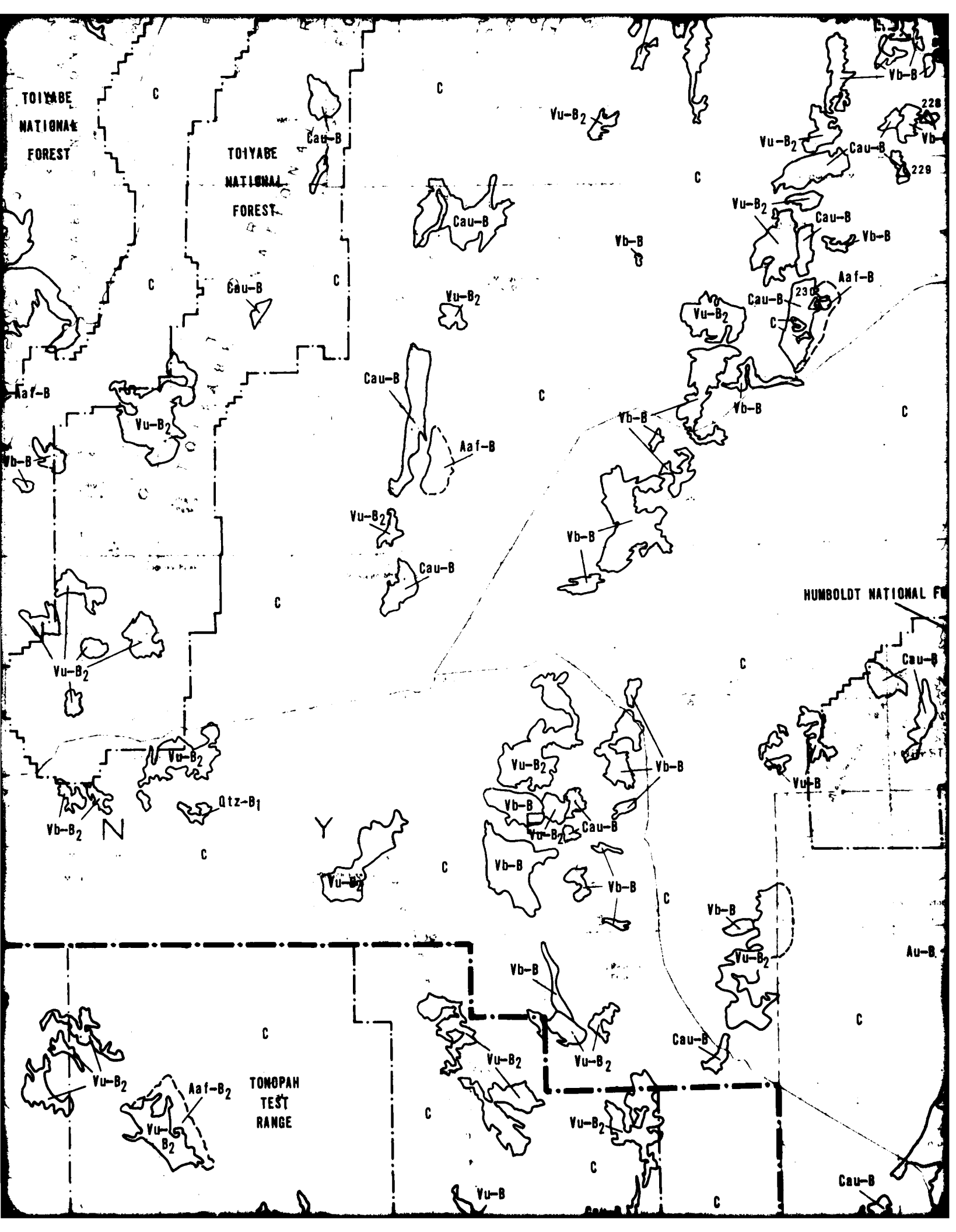

R
E U R E K A
Ls-A
gr-B2
Aaf-B
Cau-B
Par-B
Par-B2
Au-B
Qtz-A
Vb-B
Vu-B
C
1
215
216
217
218
219
220
221
222
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DUCKWATER INDIAN RESERVATION

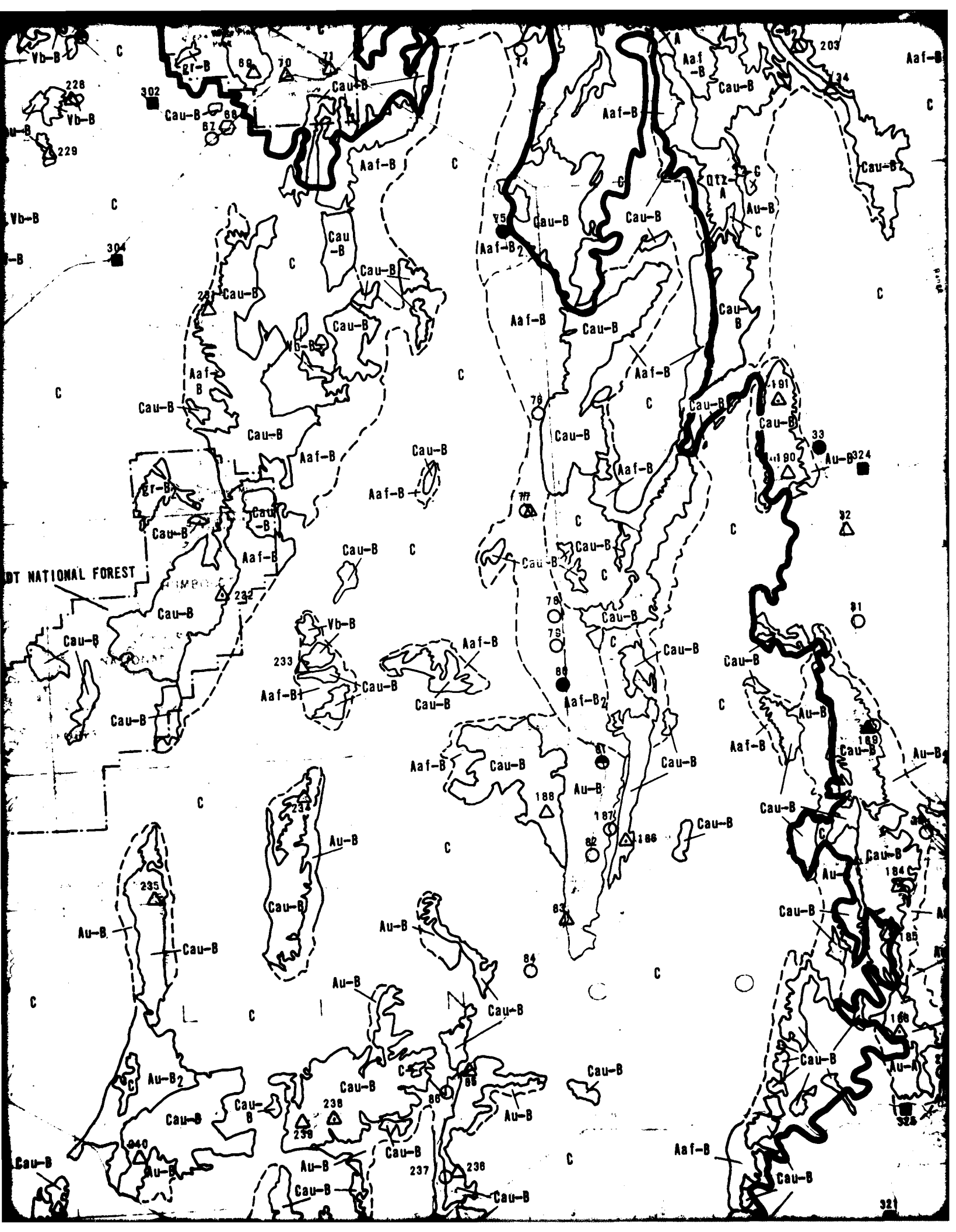

HUMBOLDT NATIONAL FOREST
HUMBOLDT NATIONAL FOREST
Yb-B
DUCKWATER INDIAN
Ls-A
gr-B2
Aaf-B
Cau-B
Par-B2
Aaf-B2
Au-B
Qtz-A
Aaf-A
Cau-B2
Par-B
Au-B2
C
N

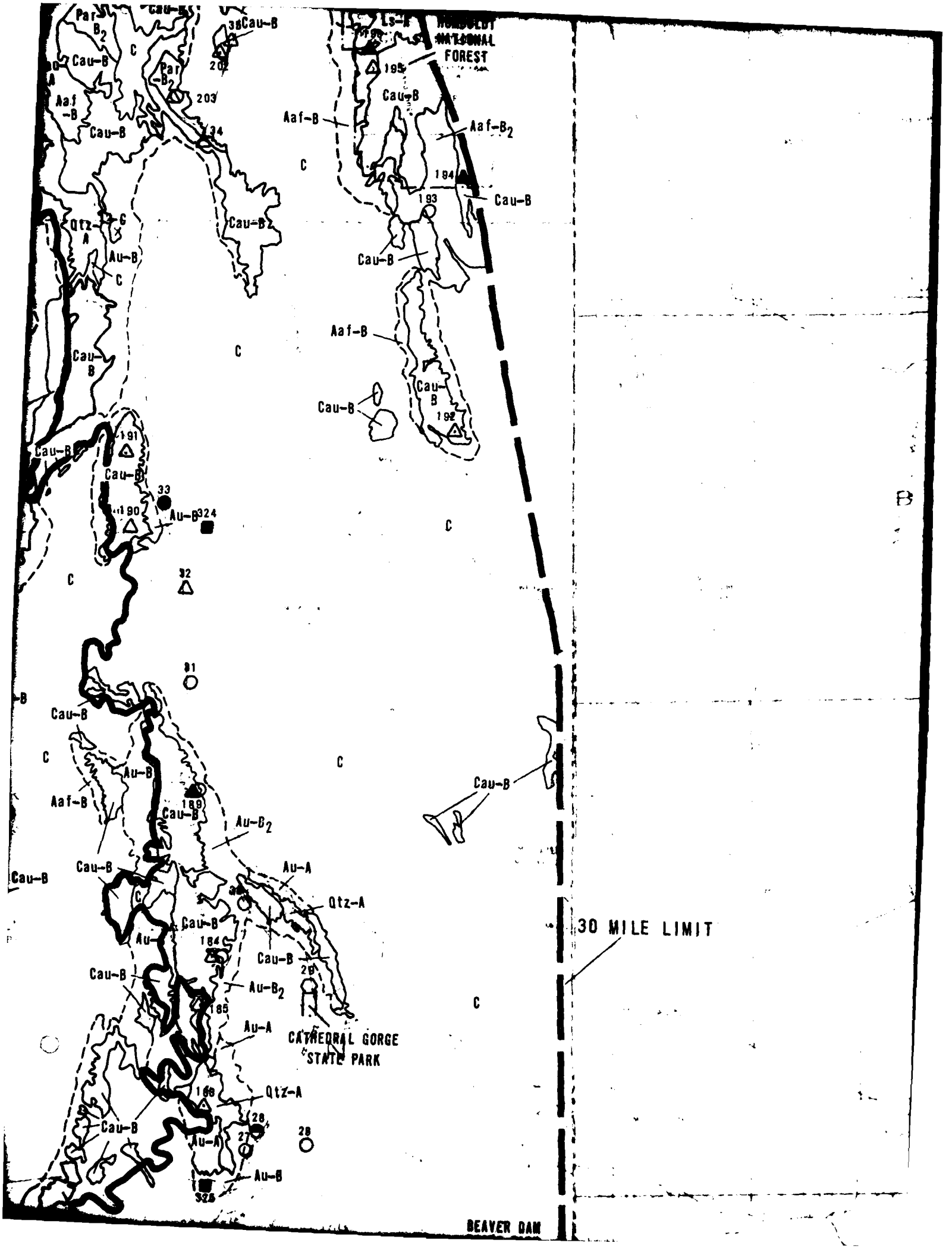

Qau-B
Cau-B
Ls-A
Au-B
Qtz-B
Qtz-A
Aaf-A
Aaf-B
Par-B2
gr-B2
gr
HUMBOLDT
NATIONAL
FOREST

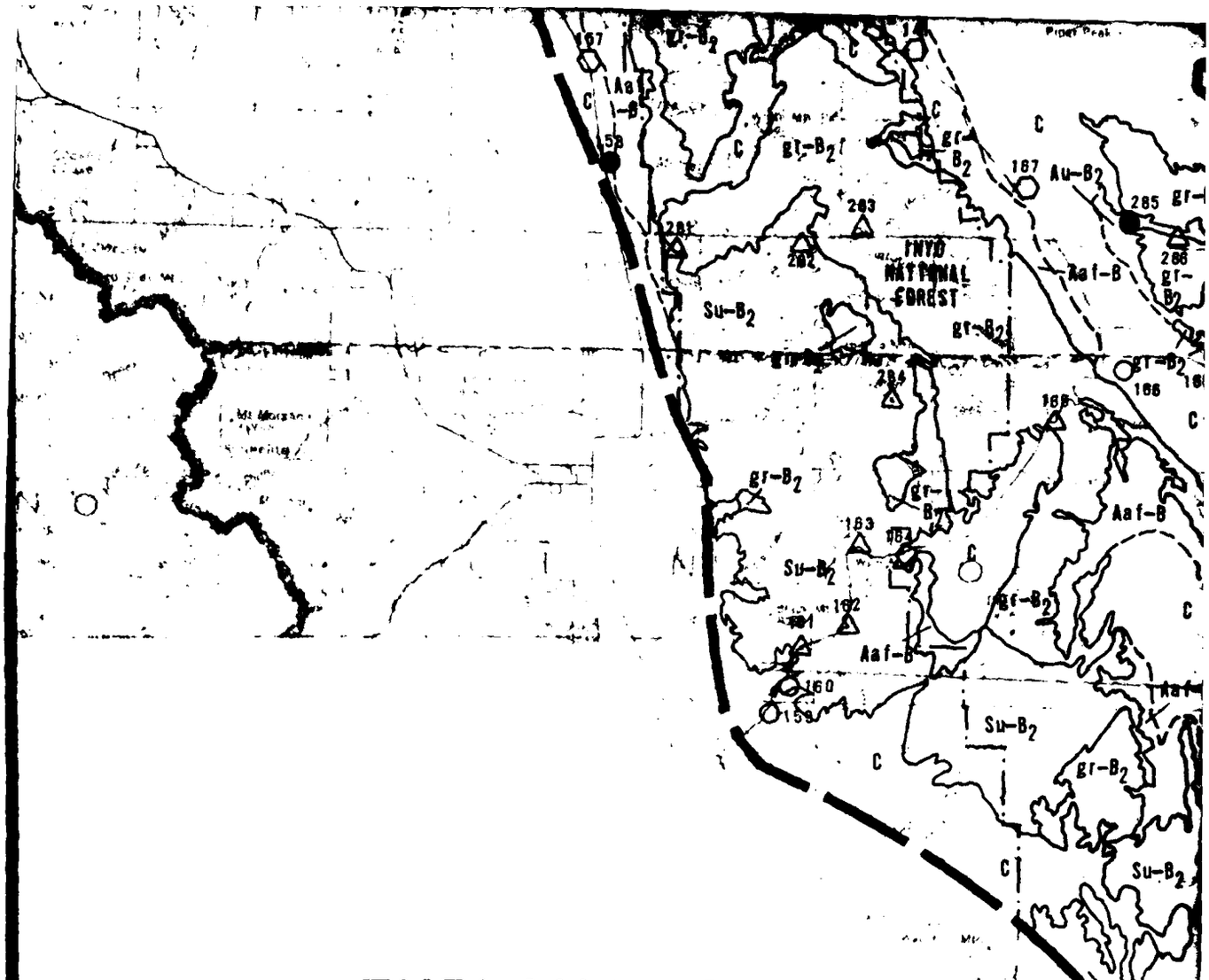

60. NV-R-60
61. NV-R-61
62. NV-R-62
63. NV-R-63
64. NV-R-64
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67. NV-R-67
68. NV-R-68
69. NV-R-69
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137. NV-R-137
138. NV-R-138
139. NV-R-139
140. NV-R-140
200. NV-H-26
201. NV-H-27
202. NV-H-28
203. NV-H-30
204. NV-H-31
205 NV-H-32
206. NV-H-33
207. NV-H-34
208. NV-H-35
209. NV-H-36
210. NV-H-37
270. NV-H-97
271. NV-H-98
272. NV-H-99
273. NV-H-100
274. HV-H-101
275. NV-H-102
276. NV-H-103
277. NV-H-104
278. NV-H-105
279. NV-H-106
280. NV-H-107
340. NV-C24
341. NV-C25
TOIYABE NATIONAL FOREST
30 MILE LIMIT
Vb-B2
gr-B2
Aaf-B2
Cau-B2
Aaf-B
Vb-B
gr-B
C
M
E S M E


YOMBA INDIAN RESERVATION
TOIYABE NATIONAL FOREST
TOIYABE NATIONAL FOREST
TOIYABE NATIONAL FOREST
NELLIS GROUP
gr-B2
Vb-B2
Cau-B
Vb-B
Qtz-B1
Vu-B2
Aaf-B2
Aaf-B
Au-B2
303
301
269
268
267
266
265
264
263
262
261
260
259
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256
255
254
253
252
251
139
138
137
136
135
134
132
131
130
N
S M E R A L D


TOIYABE NATIONAL FOREST
TOIYABE NATIONAL FOREST
TONOPAH TEST RANGE
HUMBOLDT NATIONAL F
Vu-B2
Cau-B
Vb-B
Aaf-B
Qtz-B1
Au-B
Vu-B
228
230
C
N
Y


DT NATIONAL FOREST
Aaf-B
Cau-B
Au-B
Vb-B
Gr-B
QTz-A
C
321


HUMBOLDT NATIONAL FOREST
30 MILE LIMIT
CATHEDRAL GORGE STATE PARK
BEAVER DAM
Cau-B
Aaf-B
Aaf-B2
Au-B
Au-B2
Au-A
Qtz-A
Par-B2
Ls-A
C
B
195
194
193
192
191
190
189
188
184
185
168
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31
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27
324
325



EXPLANATION

SOURCES OF POTENTIAL AGGREGATE

BASIN-FILL DEPOSITS

Aaf	Stream Channel (Af)*
Aaf	Alluvial Fan deposits (A5)
Au	Alluvial deposits Undifferentiated (A)

ROCK UNITS

Qtz	Quartzite (S1)
Ls	Limestone (S2)
Cau	Carbonate Rocks Undifferentiated (S2)
Par	Arcturus Formation (S2)
Vb	Basalt (I2 and/or I3)

SYMBOLS

FUGRO NATIONAL FIELD STATIONS

Basin-Fill Deposit
- ○ Data point, not sampled
- ◒ Sampled and not tested
- ● Sampled and tested

Rock Units
- △ Data point, not sampled
- ◬ Sampled and thin-sectioned
- ▲ Sampled and tested

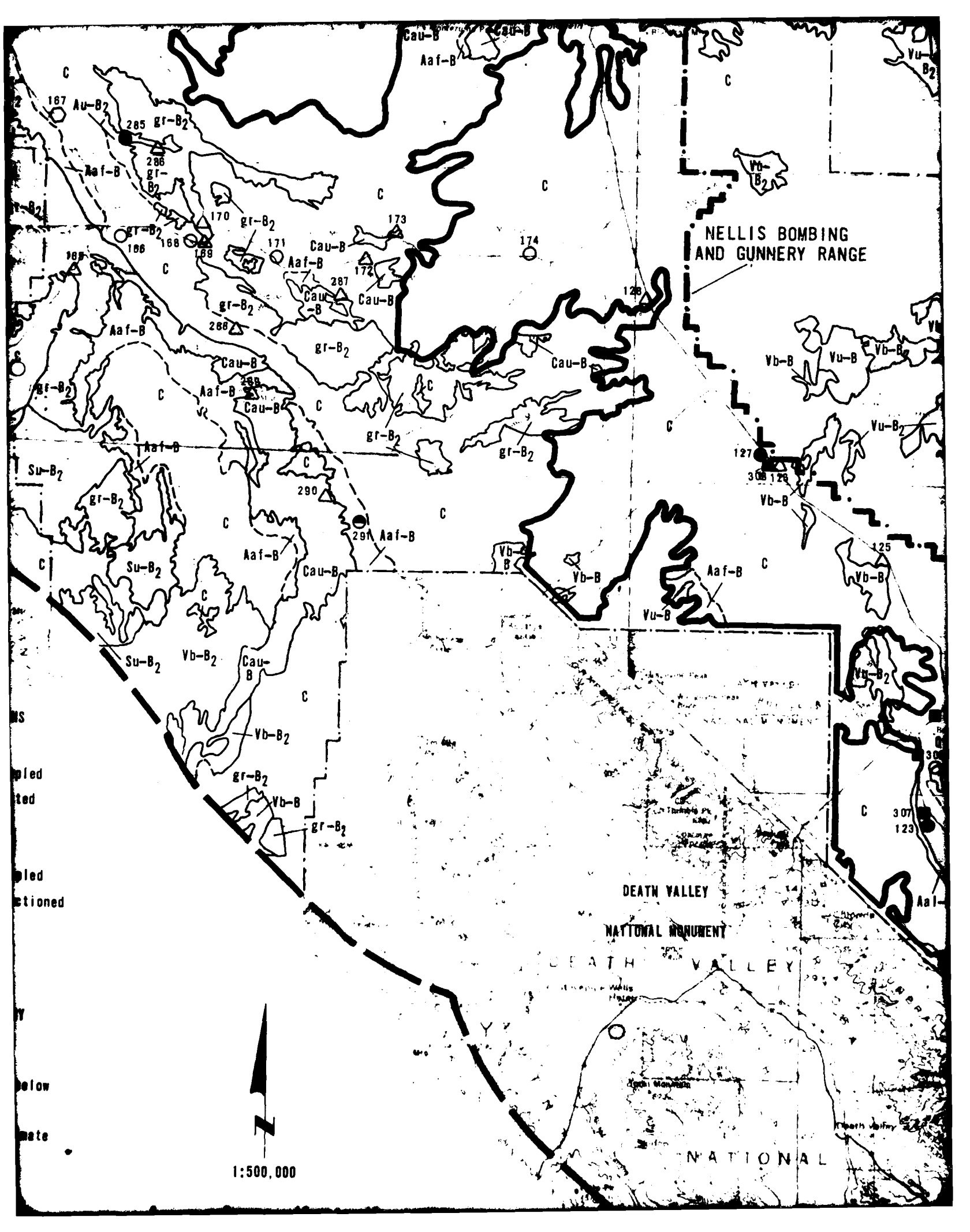
Photo Stop
- ⬡ Photograph only

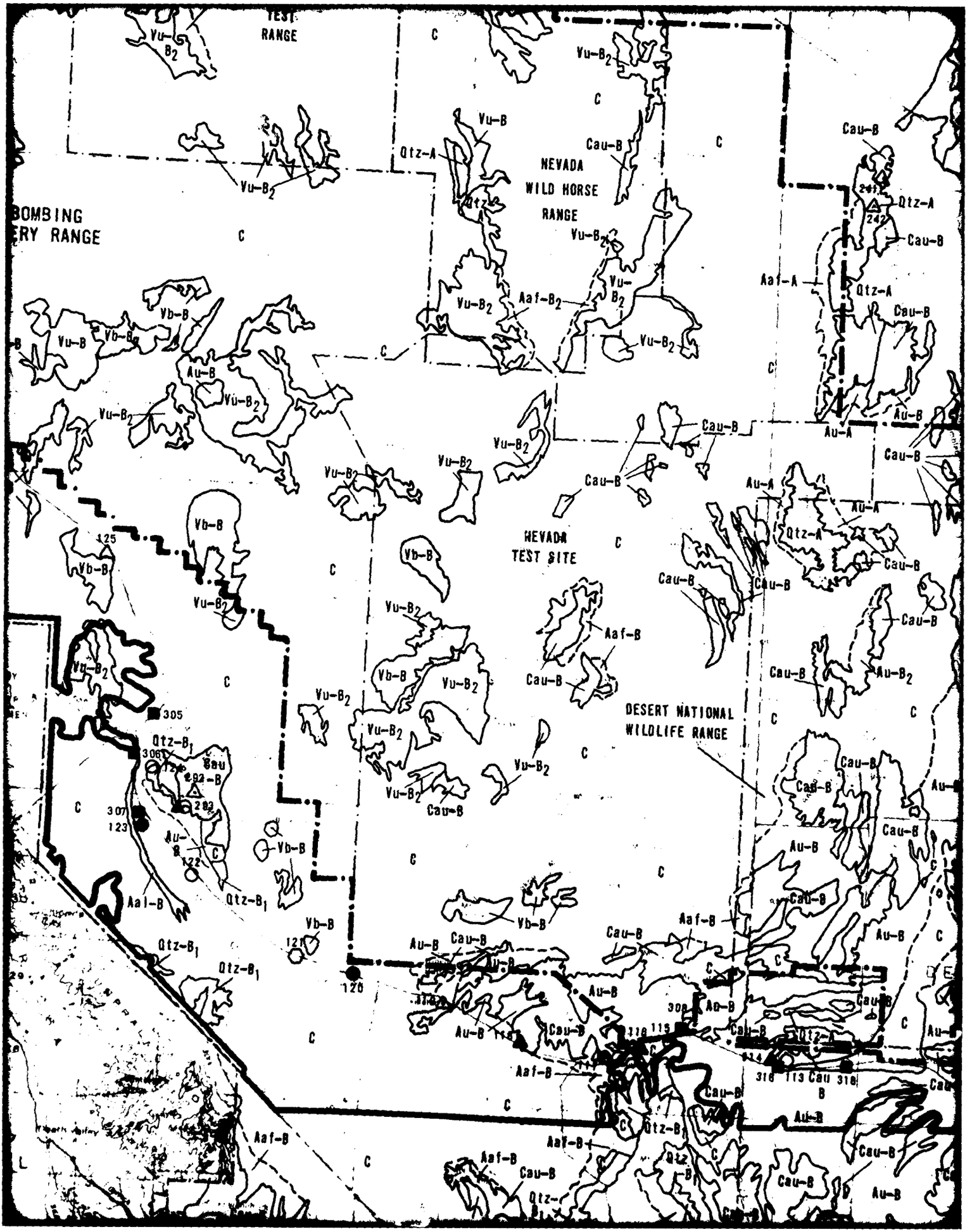
EXISTING BORROW PIT OR QUARRY
- ■ Test data available

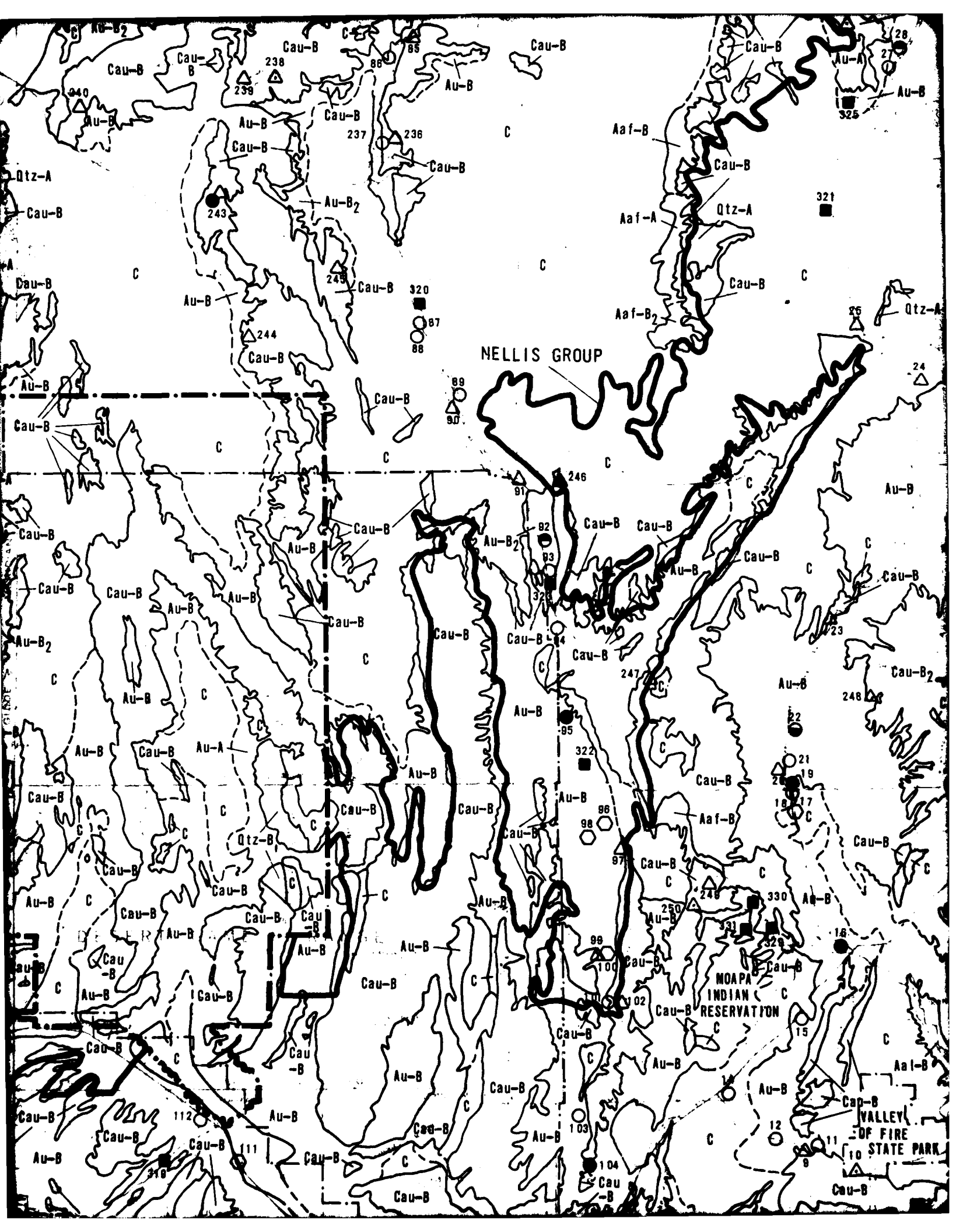
MATERIAL TYPE-RANKING

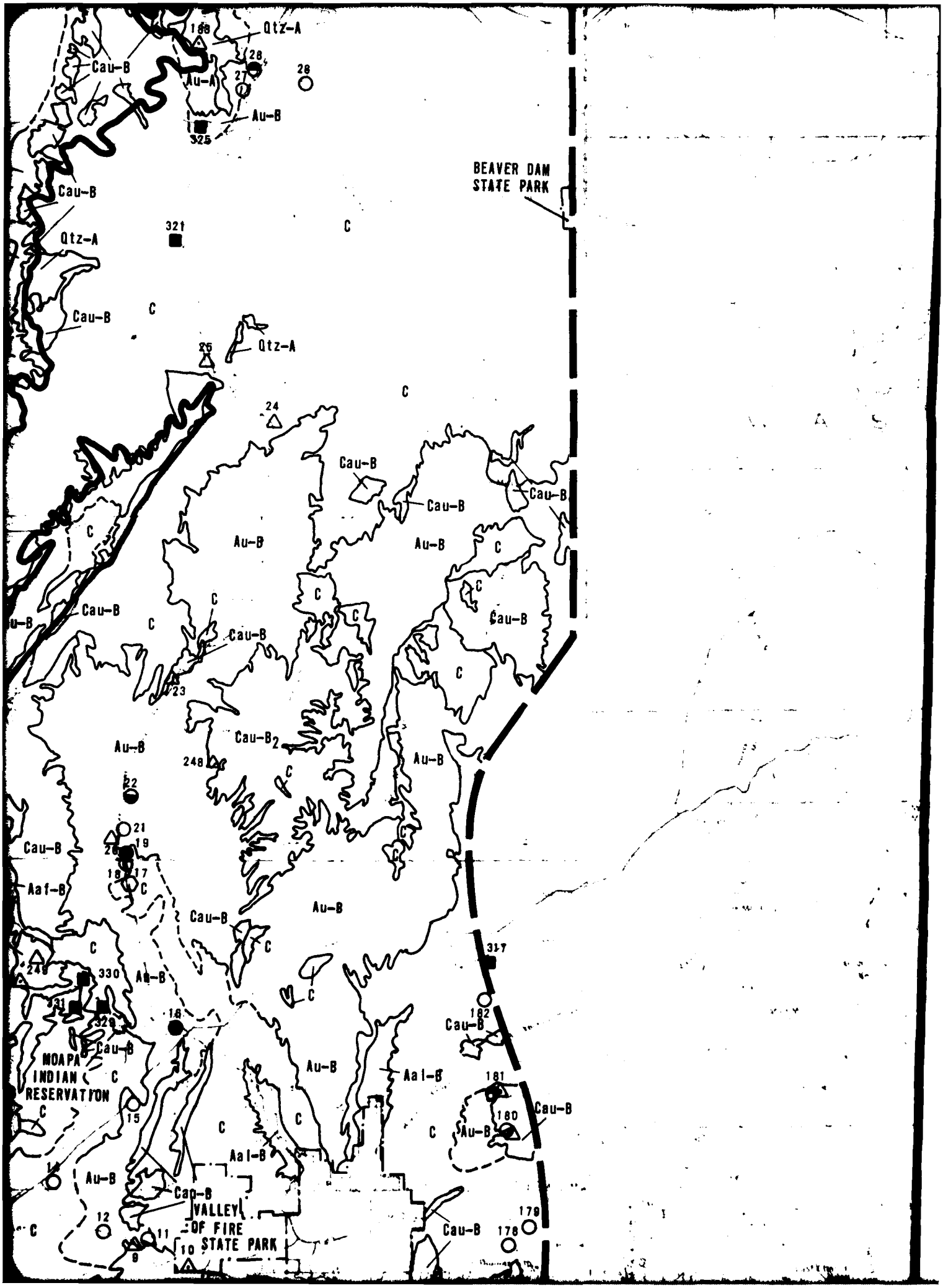
Cau-B See Ranking System below

GEOLOGIC CONTACT
- Dashed where approximate


NELLIS BOMBING
AND GUNNERY RANGE
DEATH VALLEY
NATIONAL MONUMENT
DEATH VALLEY
NATIONAL
1:500,000
Au-B2
gr-B2
Aaf-B
Cau-B
Su-B2
Vb-B2
Vb-B
Vu-B2
Vu-B
167
285
286
170
168
169
171
173
174
172
287
288
290
291
127
126
125
307
123


TEST
RANGE
BOMBING
ERY RANGE
NEVADA
WILD HORSE
RANGE
NEVADA
TEST SITE
DESERT NATIONAL
WILDLIFE RANGE
Vu-B2
Vu-B
Qtz-A
Cau-B
Aaf-B2
Aaf-A
Vb-B
Au-B
Au-A
Aaf-B
Qtz-B1
Qtz-B
Au-B2
C
125
305
306
307
123
122
121
120
242
241
282
318
316
113
114


NELLIS GROUP
MOAPA INDIAN RESERVATION
VALLEY OF FIRE STATE PARK
Cau-B
Au-B
Au-B2
Au-A
Aaf-B
Aaf-A
Aaf-B2
Qtz-A
Qtz-B
C


Qtz-A
Cau-B
Au-A
Au-B
BEAVER DAM
STATE PARK
C
Aal-B
MOAPA
INDIAN
RESERVATION
VALLEY
OF FIRE
STATE PARK

EXPLANATION

SOURCES OF POTENTIAL AGGREGATE

BASIN-FILL DEPOSITS

Aal	Stream Channel (A1)*
Aaf	Alluvial Fan deposits (A5)
Au	Alluvial deposits Undifferentiated (A)

ROCK UNITS

Qtz	Quartzite (S1)
Ls	Limestone (S2)
Cau	Carbonate Rocks Undifferentiated (S2)
Par	Arcturus Formation (S2)
Vb	Basalt (I2 and/or I3)
gr	Granite (I1)
gn	Gneiss and Associated Metamorphics (M)
Su	Sedimentary Rocks Undifferentiated (S)
Vu	Volcanic Rocks Undifferentiated (I)

SYMBOLS

FUGRO NATIONAL FIELD STATIONS

Basin-Fill Deposit

- ○ Data point, not sampled
- ◒ Sampled and not tested
- ● Sampled and tested

Rock Units

- △ Data point, not sampled
- ◬ Sampled and thin-sectioned
- ▲ Sampled and tested

Photo Stop

- ⬡ Photograph only

EXISTING BORROW PIT OR QUARRY

- ■ Test data available

MATERIAL TYPE-RANKING

Cau-B See Ranking System below

GEOLOGIC CONTACT

Dashed where approximate

Su-B_2

0

0

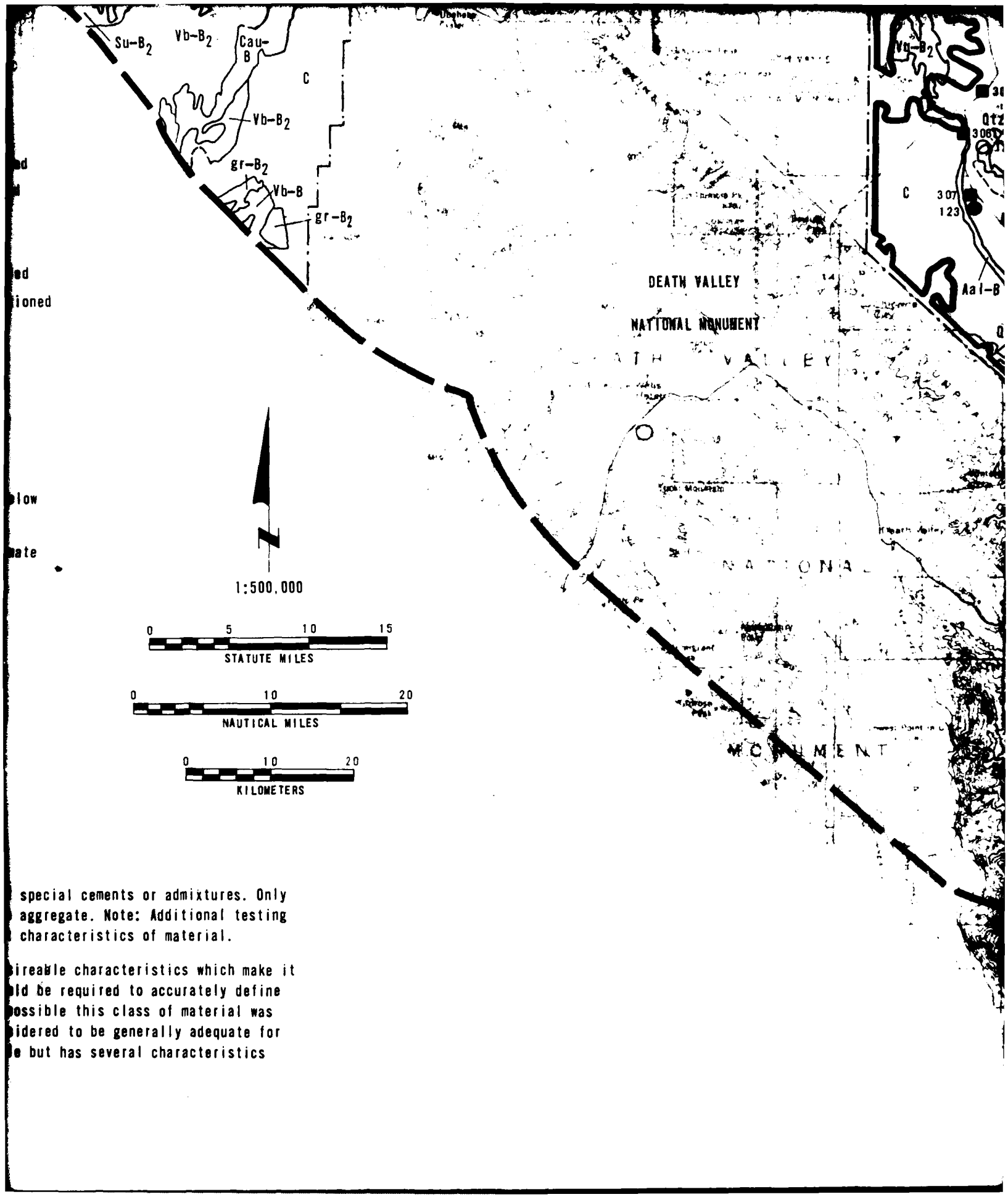
RANKING SYSTEM

A CLASS A: Potential sources of high quality aggregate not requiring the use of special cements or adm nominal processing necessary to meet known requirements for concrete aggregate. Note: Additi and case history studies needed to confirm adequacy and define exact characteristics of mat

B CLASS B: Potential sources of concrete aggregate exhibiting one or more undesireable characteristics of poorer quality than CLASS A aggregate. Detailed investigation would be required to accura aggregate suitability and probable concrete characteristics. Where possible this class of m divided into subunits B_1 and B_2. Materials classified as B_1 are considered to be generally concrete aggregate. B_2 material is considered to be probably suitable but has several chara which may make it marginal for use as a concrete aggregate.

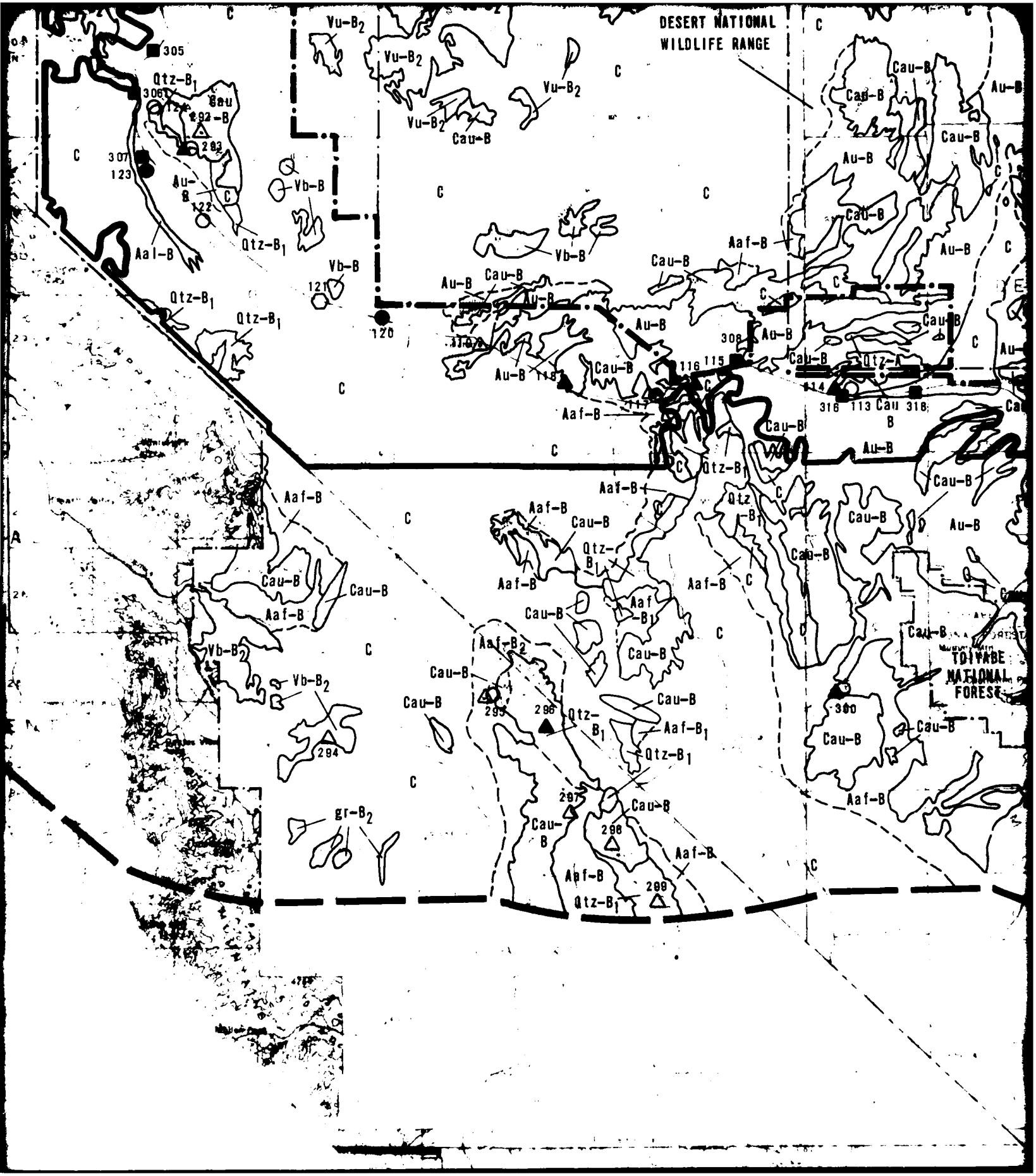
C CLASS C: Material considered undesireable for use as concrete aggregate.

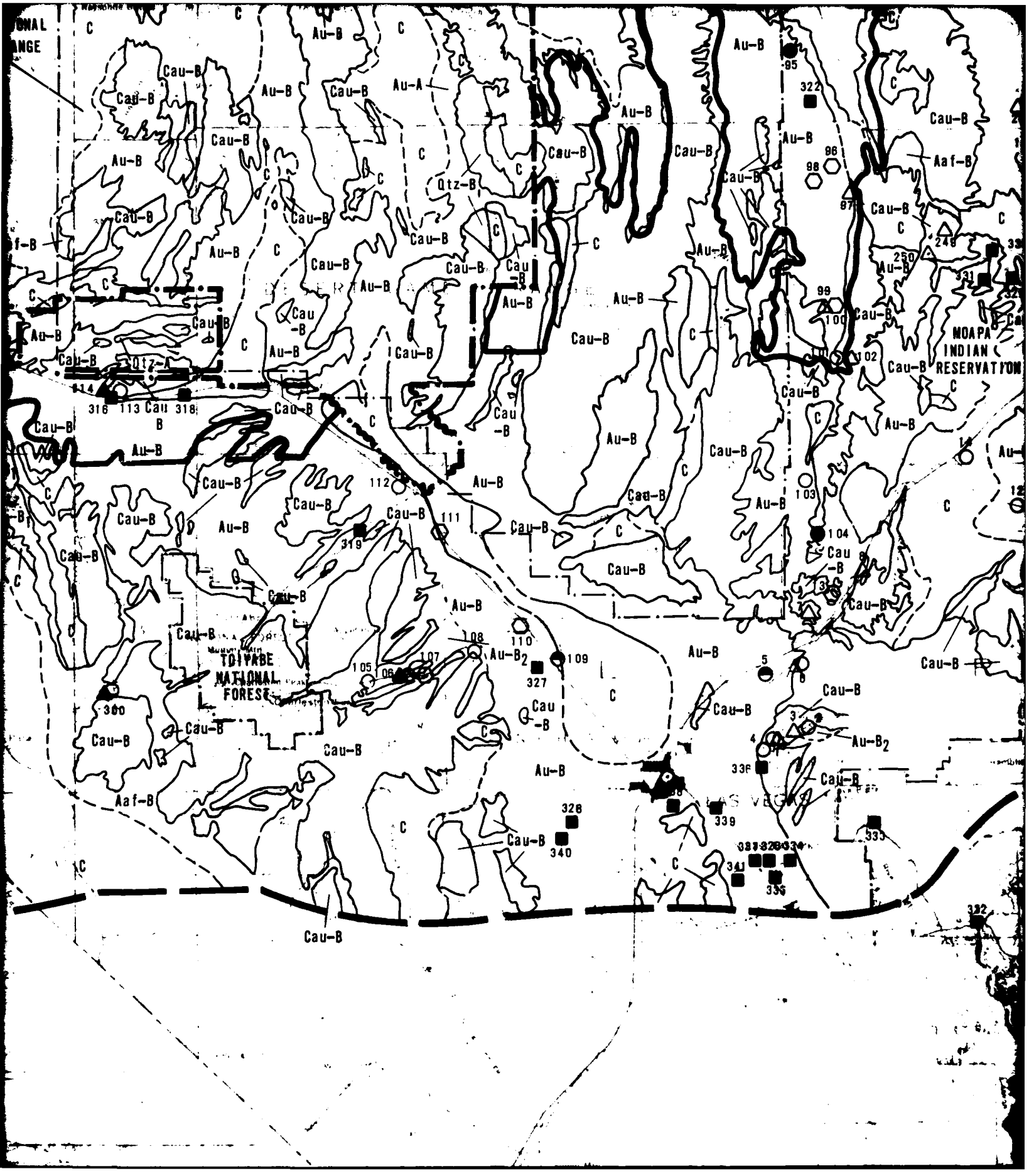
*Reference Appendix G for explanation and comparison.

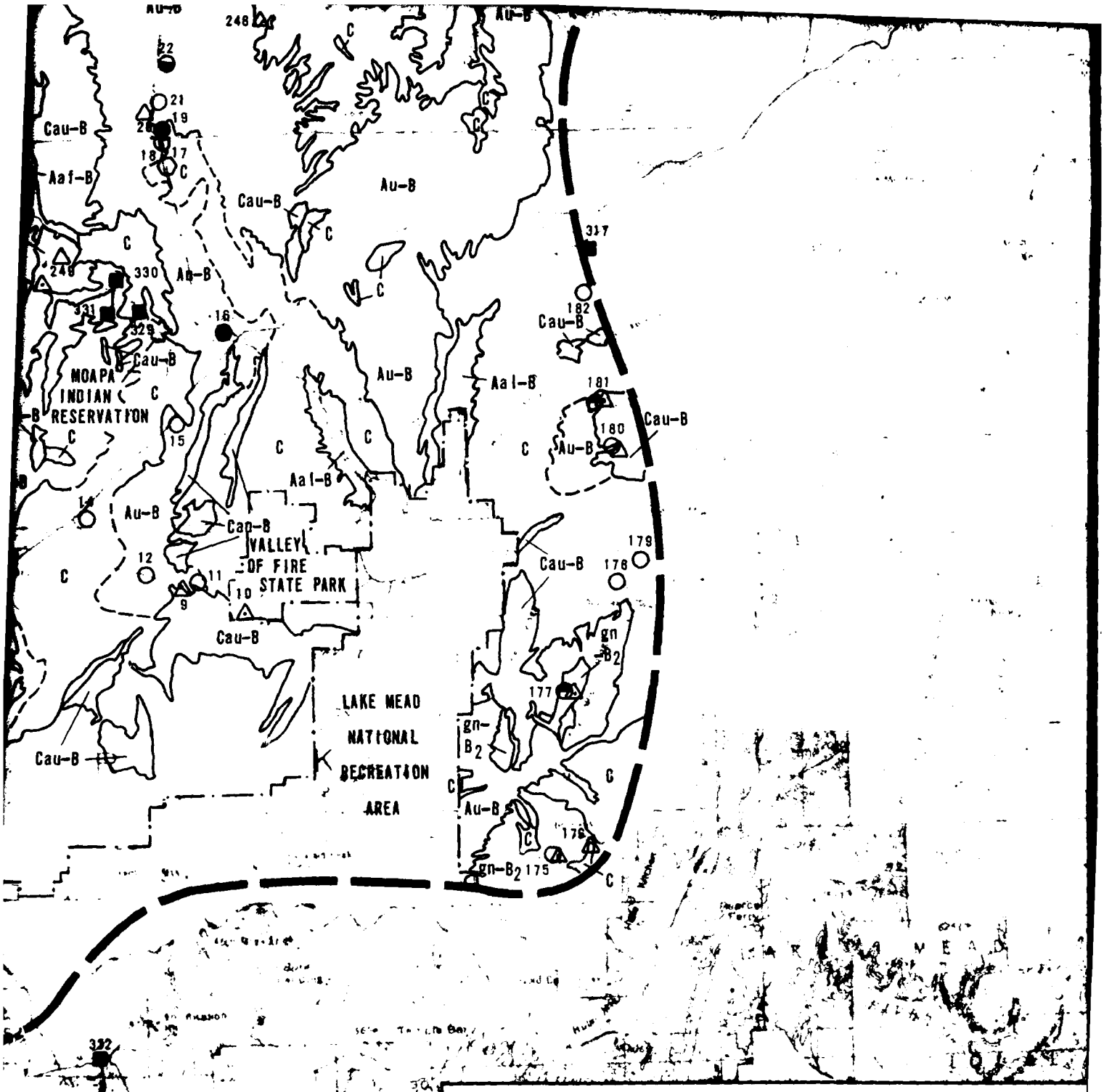


special cements or admixtures. Only
aggregate. Note: Additional testing
characteristics of material.

ireable characteristics which make it
ld be required to accurately define
ossible this class of material was
idered to be generally adequate for
e but has several characteristics


DESERT NATIONAL
WILDLIFE RANGE
TOIYABE
NATIONAL
FOREST
Vu-B2
Qtz-B1
Cau-B
Au-B
Aal-B
Vb-B
Aaf-B
Aaf-B1
Aaf-B2
Vb-B2
gr-B2
305
306
307
123
122
121
120
292-B
293
294
295
296
297
298
299
300
308
316
113
318
116
115
118
117
314


TOIYABE
NATIONAL
FOREST
MOAPA
INDIAN
RESERVATION
LAS VEGAS
Au-B
Cau-B
Au-A
Qtz-B
Qtz-A
Aaf-B
Au-B2
C

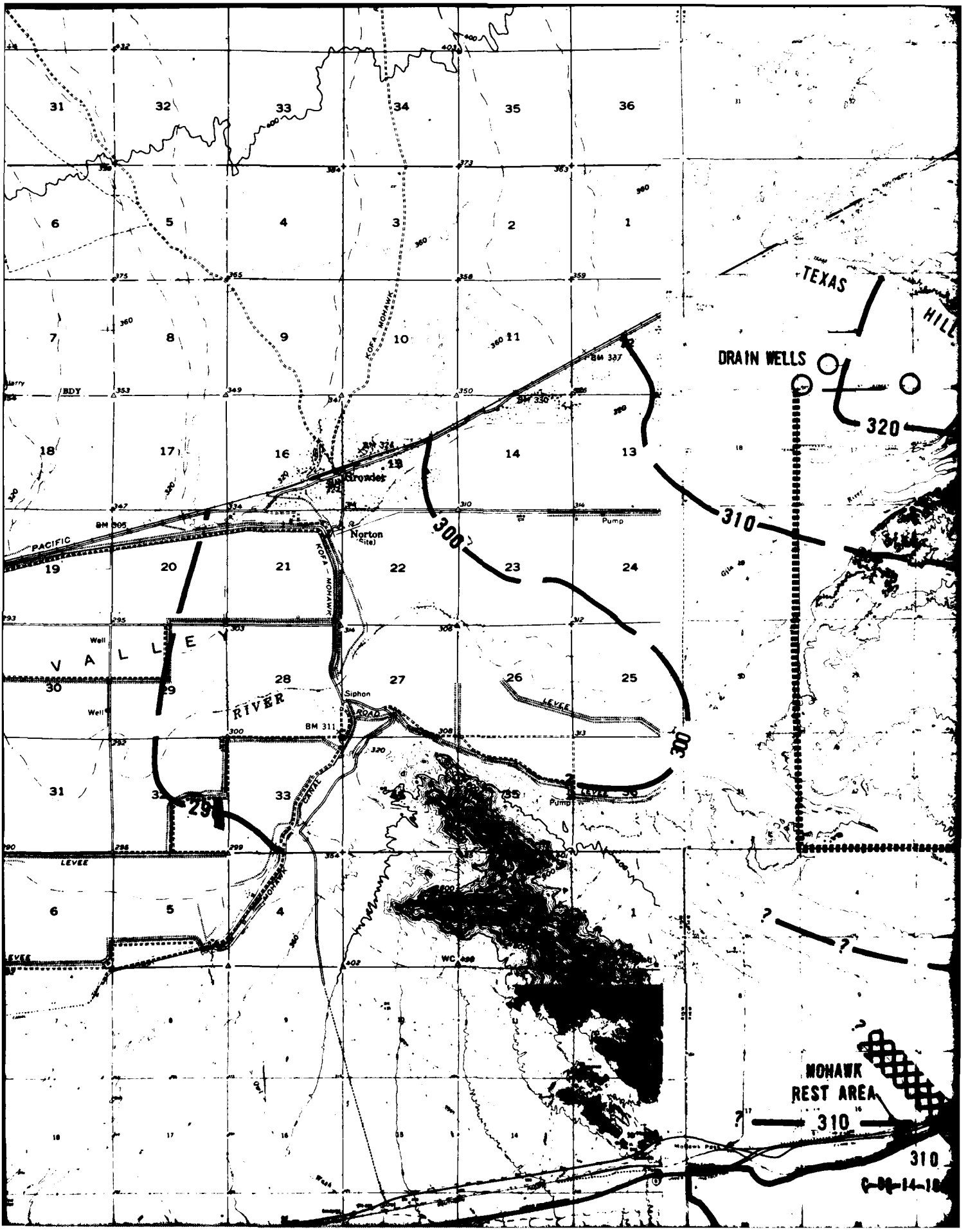


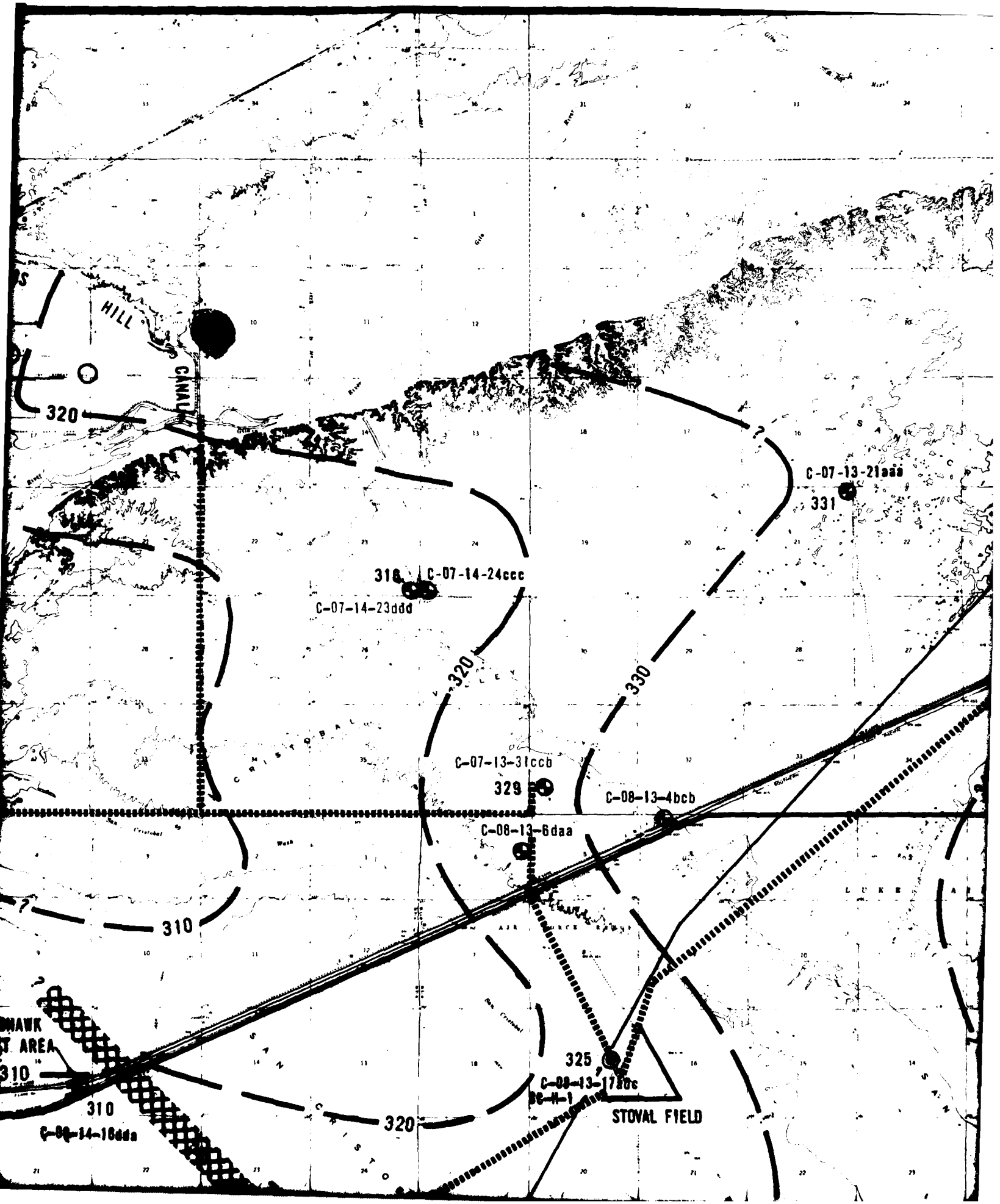
NEVADA-CALIFORNIA AGGREGATE RESOURCE MAP

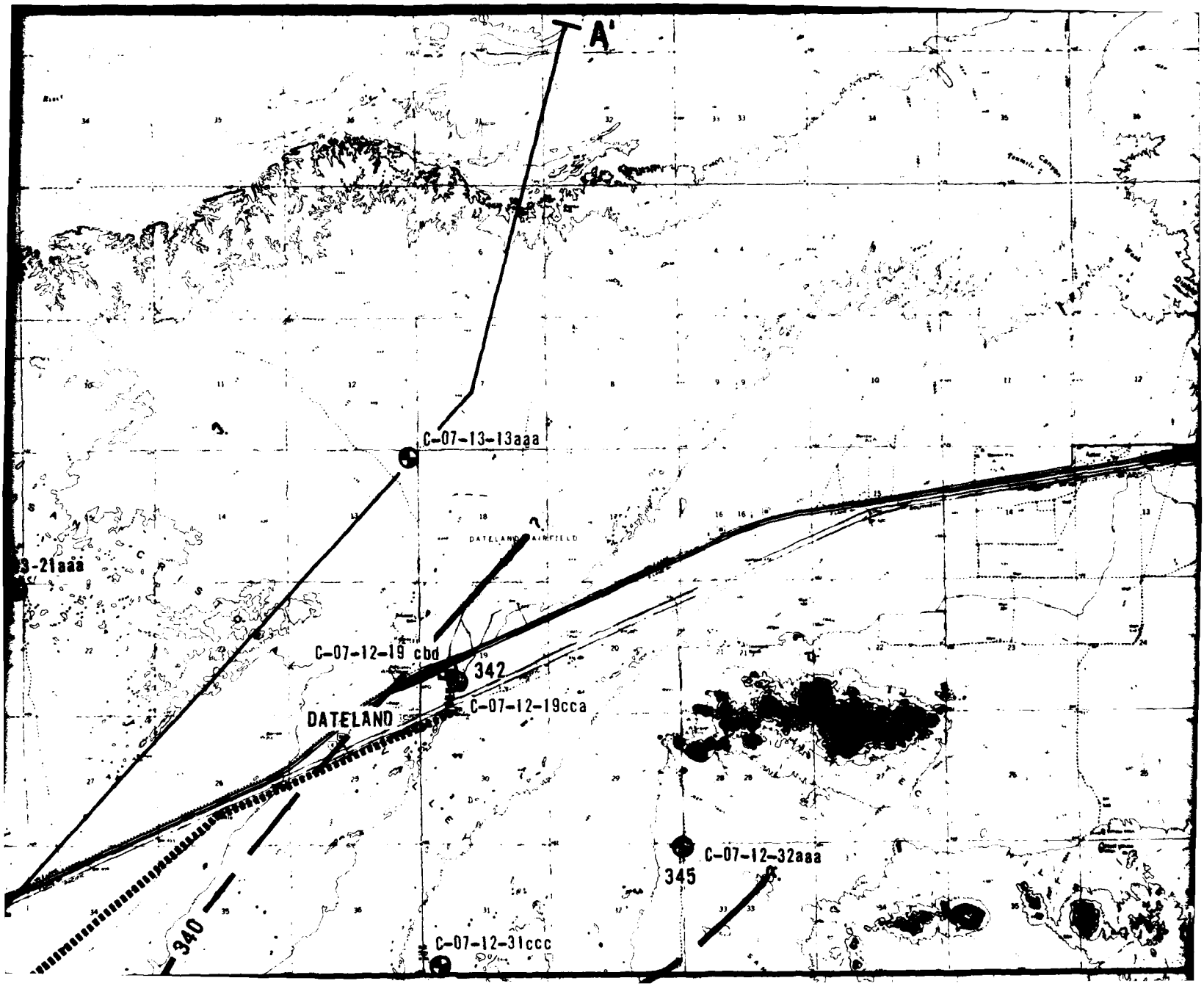
MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

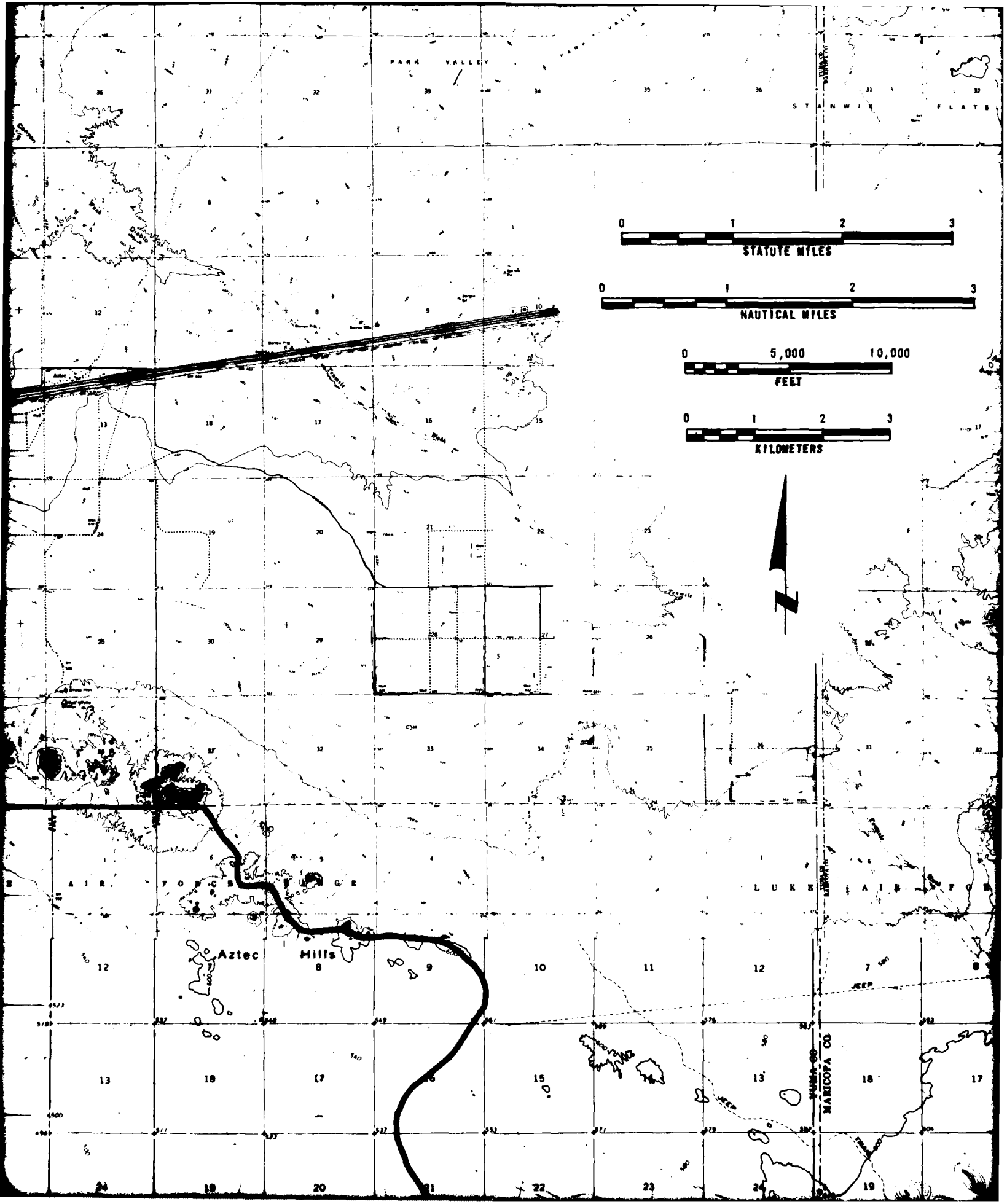
DRAWING
5.1-C

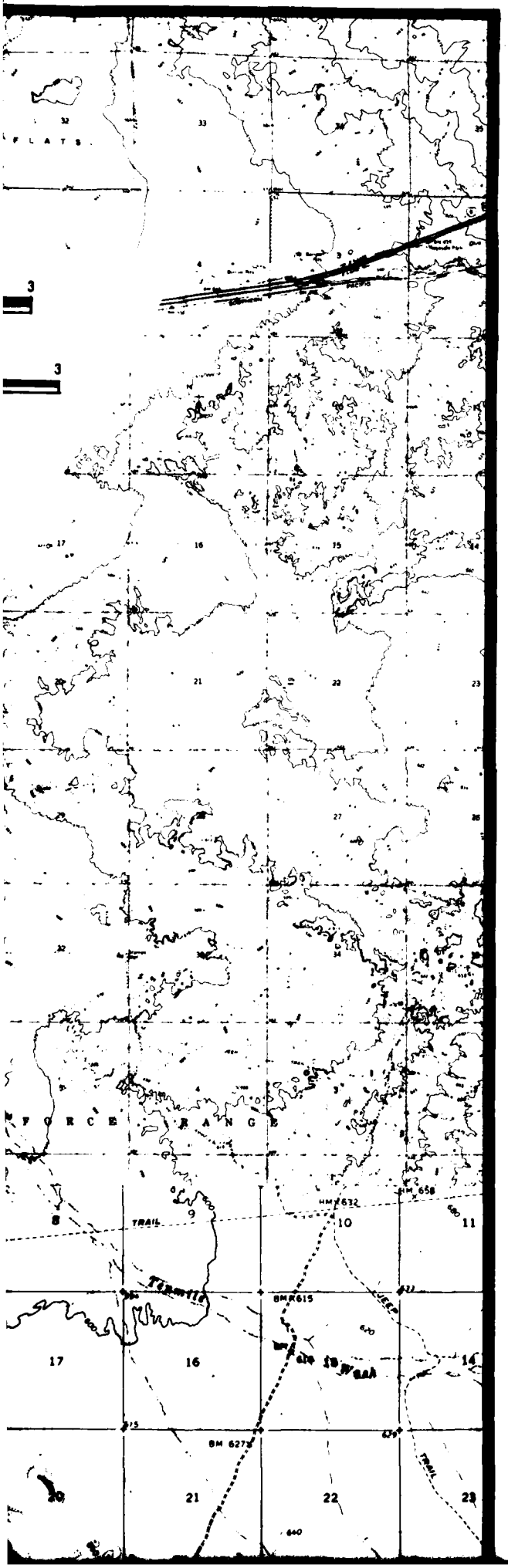
FUGRO NATIONAL, INC.


TEXAS
DRAIN WELLS
320
310
300
30
29
Norton
(site)
Crowder
PACIFIC
KOFA - MOHAWK
CANAL
RIVER
VALLEY
LEVEE
ROAD
Siphon
Pump
Well
BM 311
BM 387
BM 330
BM 324
BM 305
MOHAWK
REST AREA
310
310


HILL
CANAL
320
C-07-13-21aaa
331
316
C-07-14-24ccc
C-07-14-23ddd
320
330
C-07-13-31ccb
329
C-08-13-4bcb
C-08-13-6daa
310
325
C-08-13-17adc
STOVAL FIELD
320
310
310


A'
C-07-13-13aaa
3-21aaa
C-07-12-19 cbd
342
C-07-12-19cca
DATELAND
C-07-12-32aaa
345
340
C-07-12-31ccc


PARK VALLEY
STANWIX FLATS
0 1 2 3
STATUTE MILES
0 1 2 3
NAUTICAL MILES
0 5,000 10,000
FEET
0 1 2 3
KILOMETERS
AIR FORCE RANGE
LUKE AIR FORCE
Aztec Hills
JEEP
MARICOPA CO
YUMA CO



EXPLAN

	Existing
	Fugro Na
SC-H-1	Fugro Na
C-08-12-32aaa	Arizona S
386	Water Le
? 300	Contour Queried Datum is
	Possible
A A'	Line of W
	Possible

NOTE: Contours in Gila United States Bureau of Ground-Water Elevations

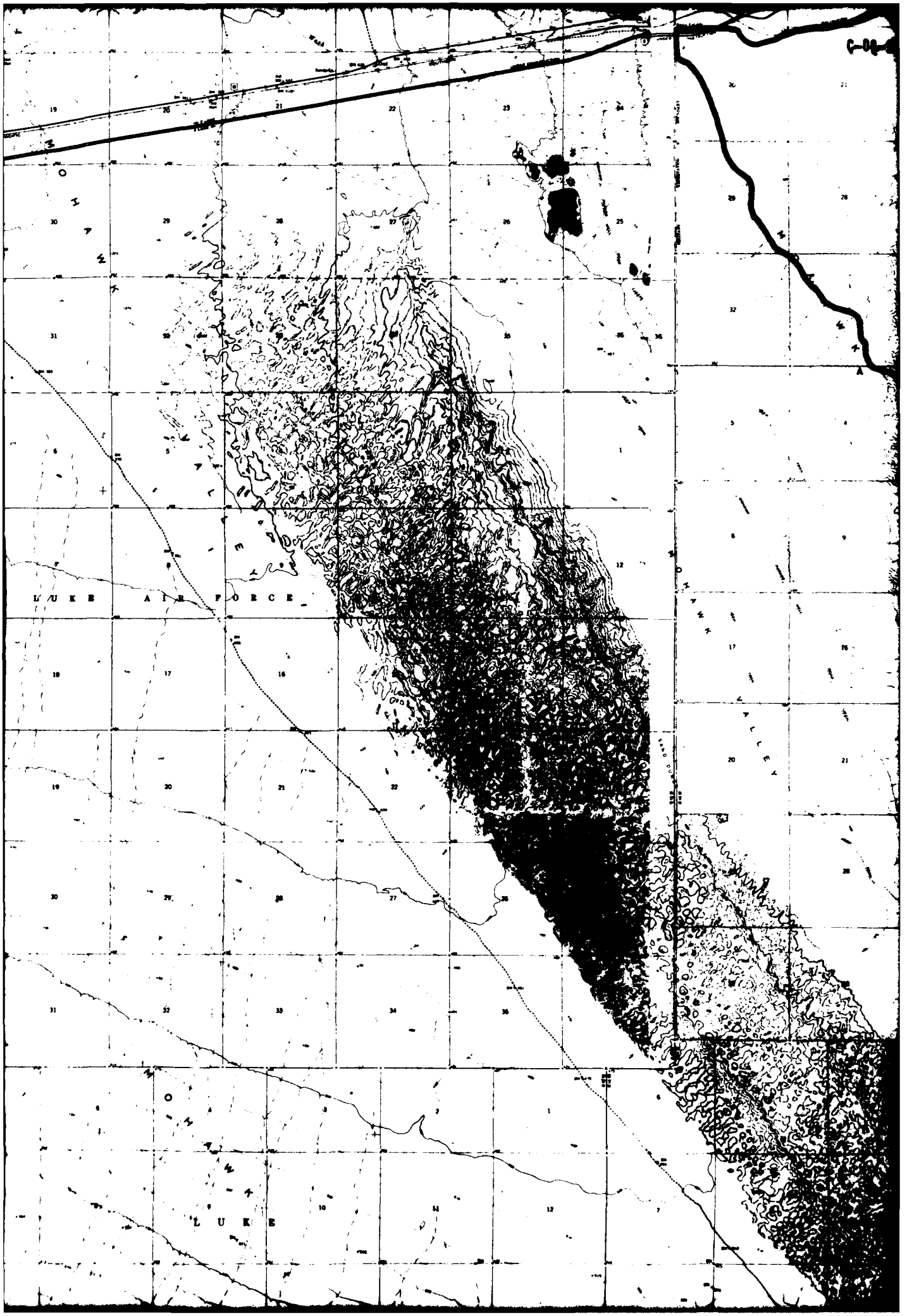
BASE MAP REFERENCE: Ap U.S.G.S. National Topog coverage.

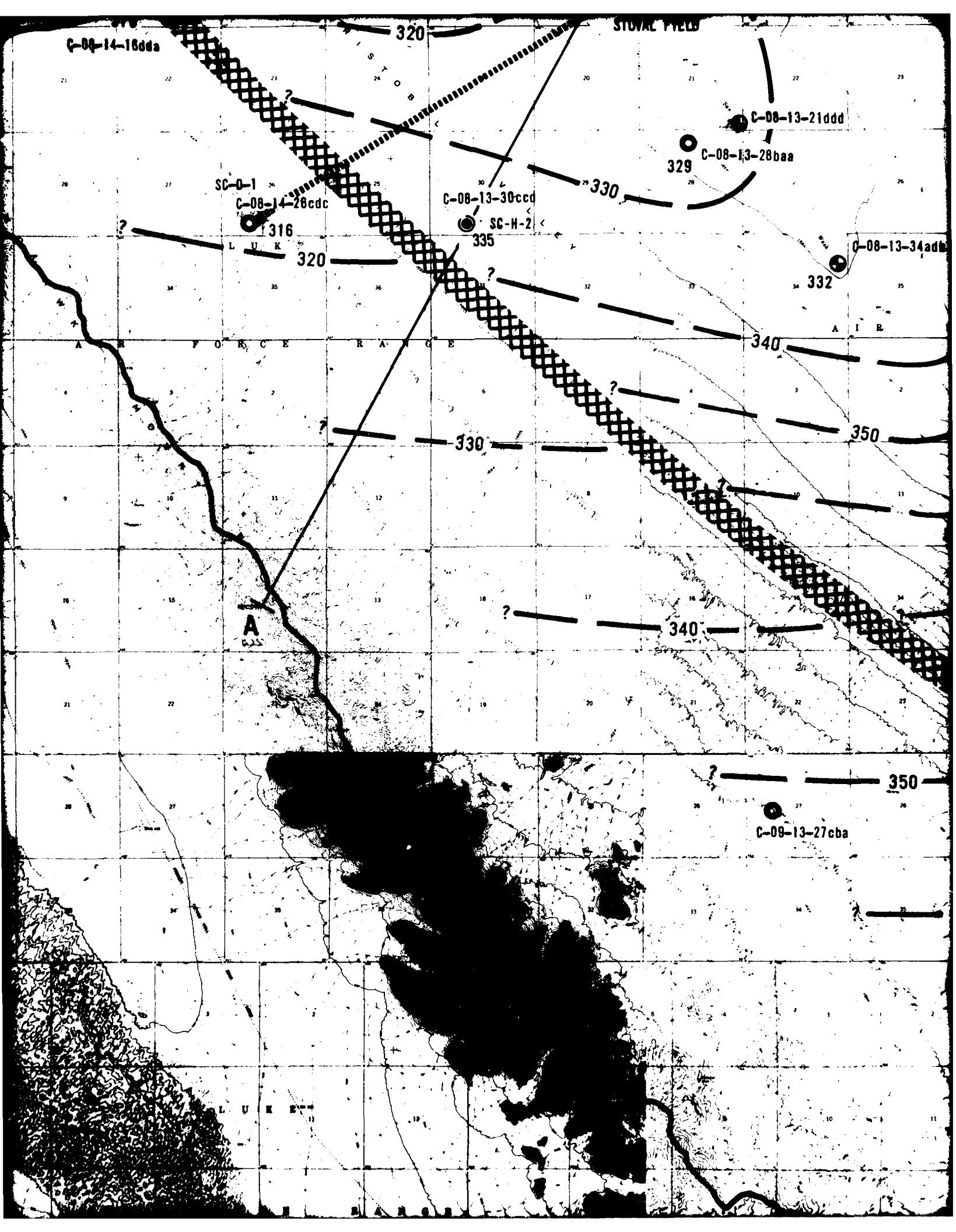
EXPLANATION

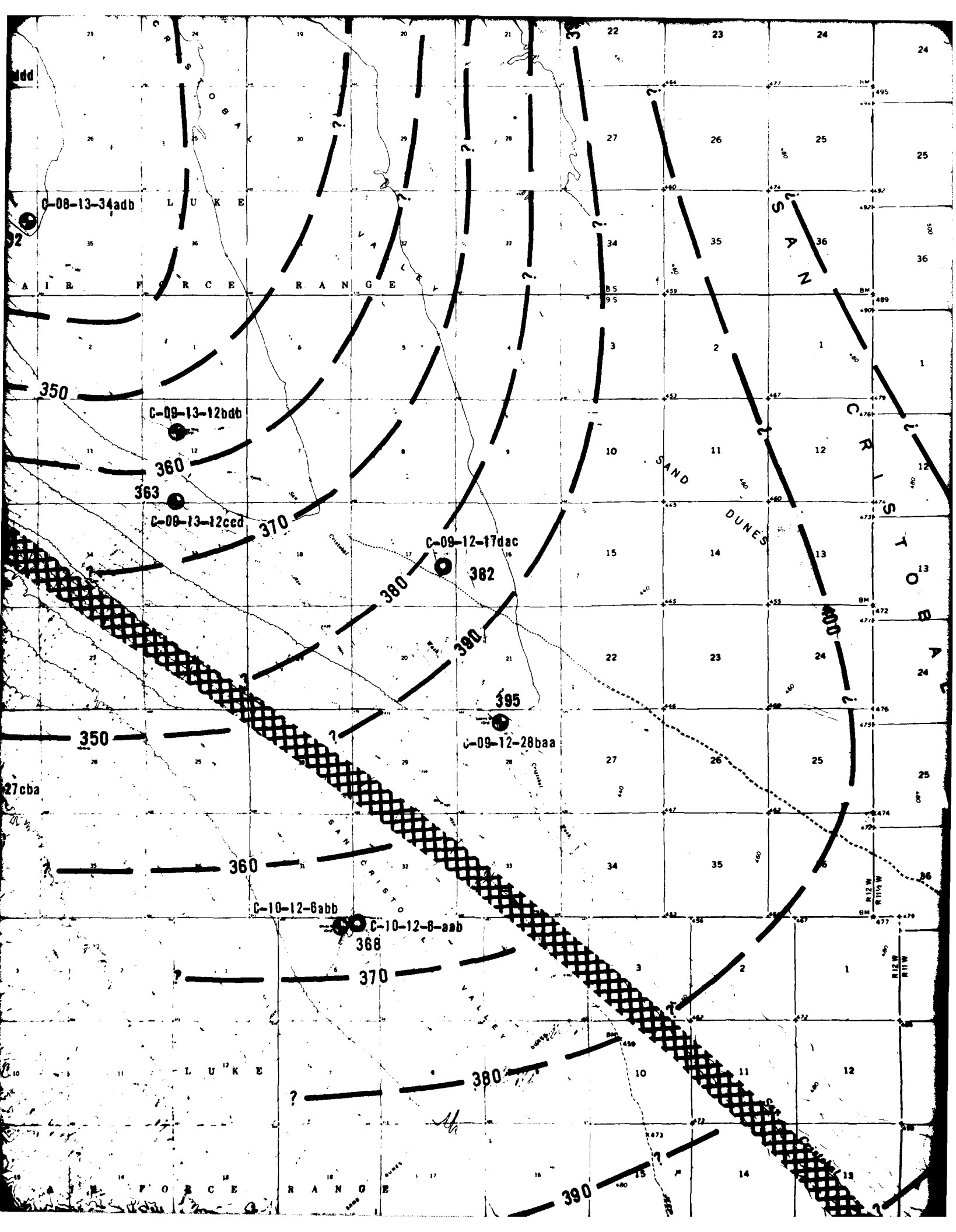
●	Existing Well
◎	Fugro National Engineering Boring
◉ SC-H-1	Fugro National Water Exploration Well
C-08-12-32aaa	Arizona State Well Number
386	Water Elevation in well
—?— 300 —	Contour on ground-water surface (July 1977); Queried where uncertain. Contour interval is 10 feet; Datum is Mean Sea Level.
⊠⊠⊠	Possible ground-water barrier
A ——— A'	Line of Hydrogeologic cross section
▪▪▪▪▪▪▪▪▪▪	Possible Pipeline Alignments

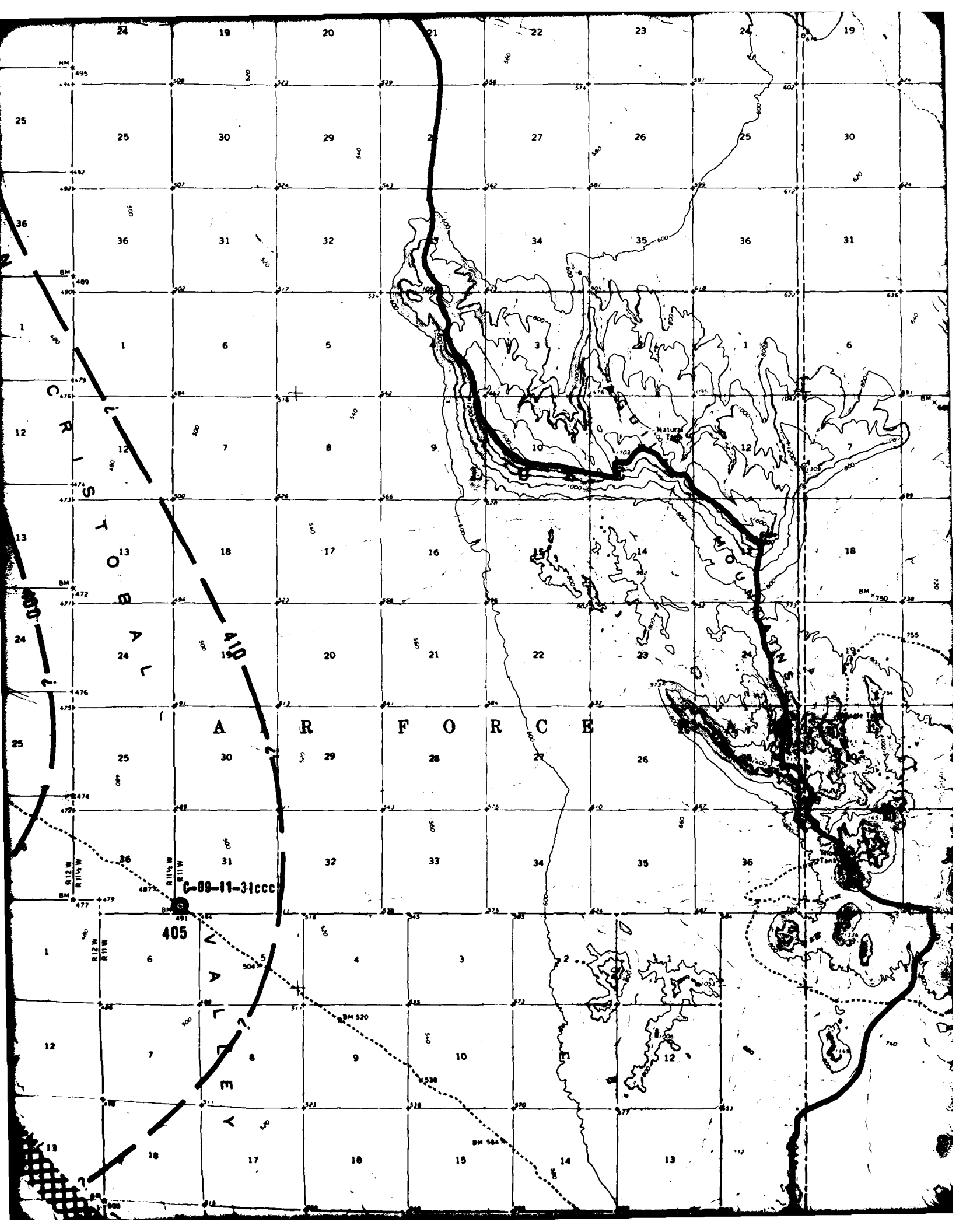
NOTE: Contours in Gila River Area from United States Bureau of Reclamation Map-Ground-Water Elevations, June 1977.

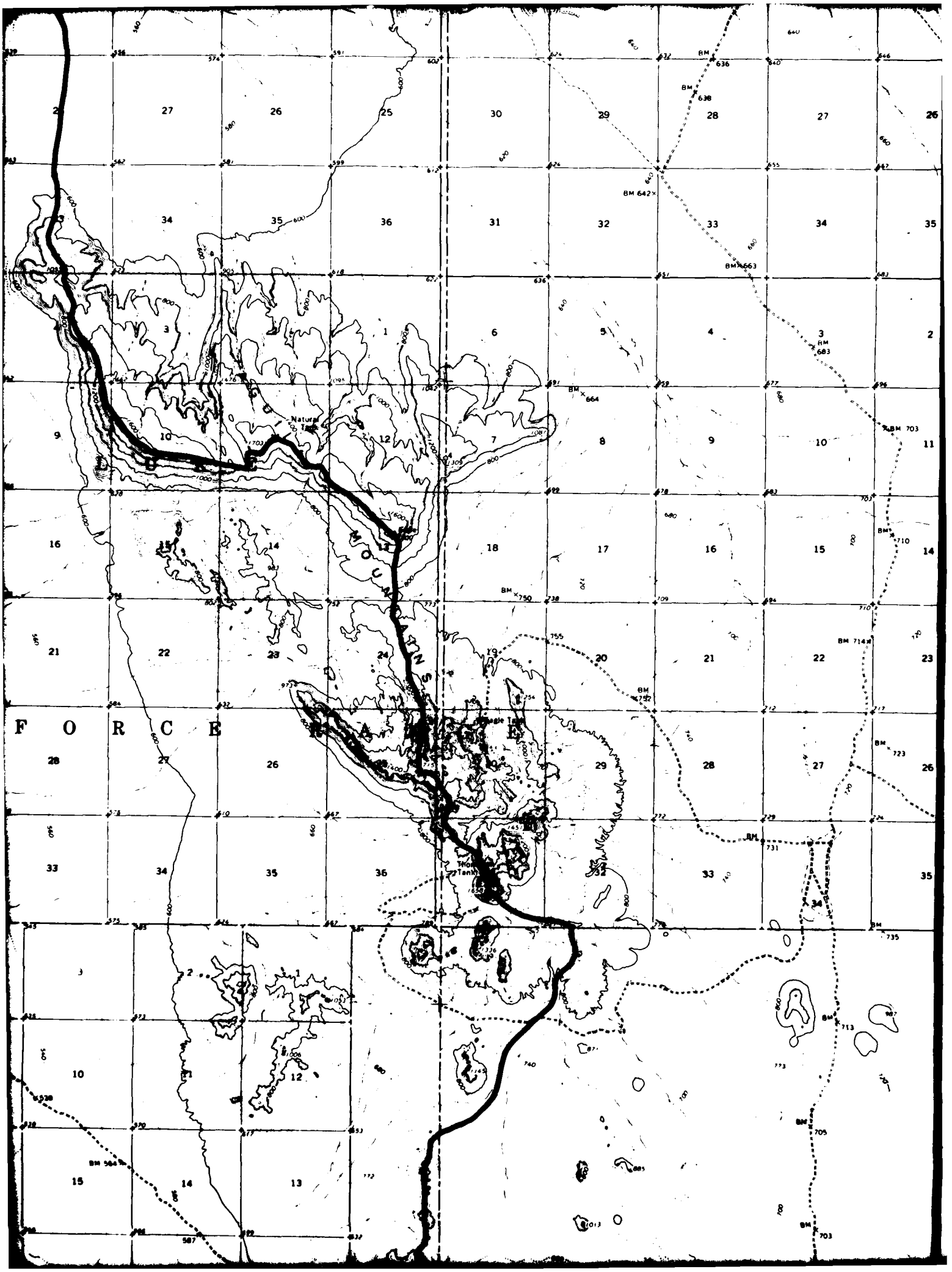
BASE MAP REFERENCE: Appropriate 7½' and 15' U.S.G.S. National Topographic Map Series coverage.

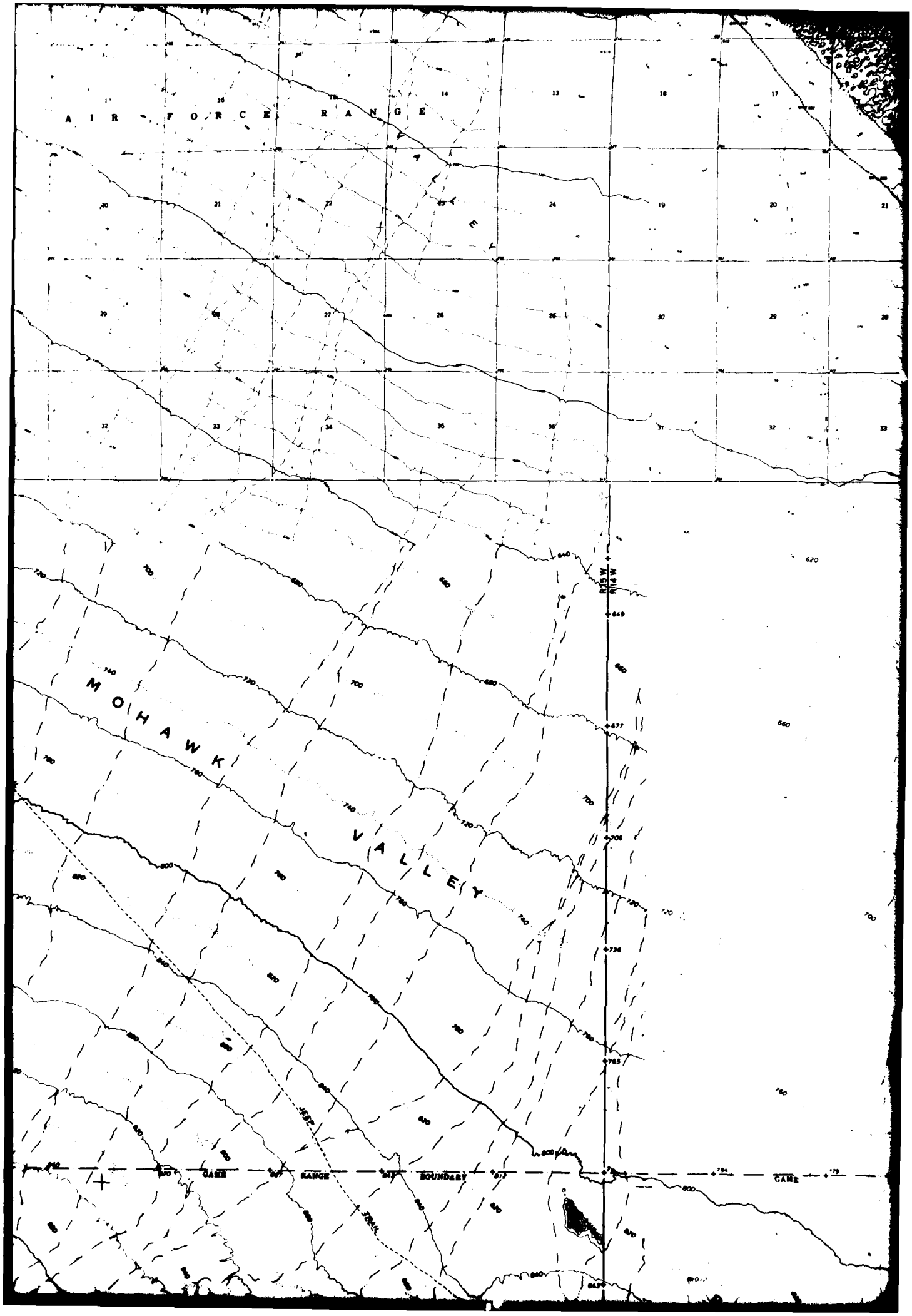

LUKE AIR FORCE
LUKE

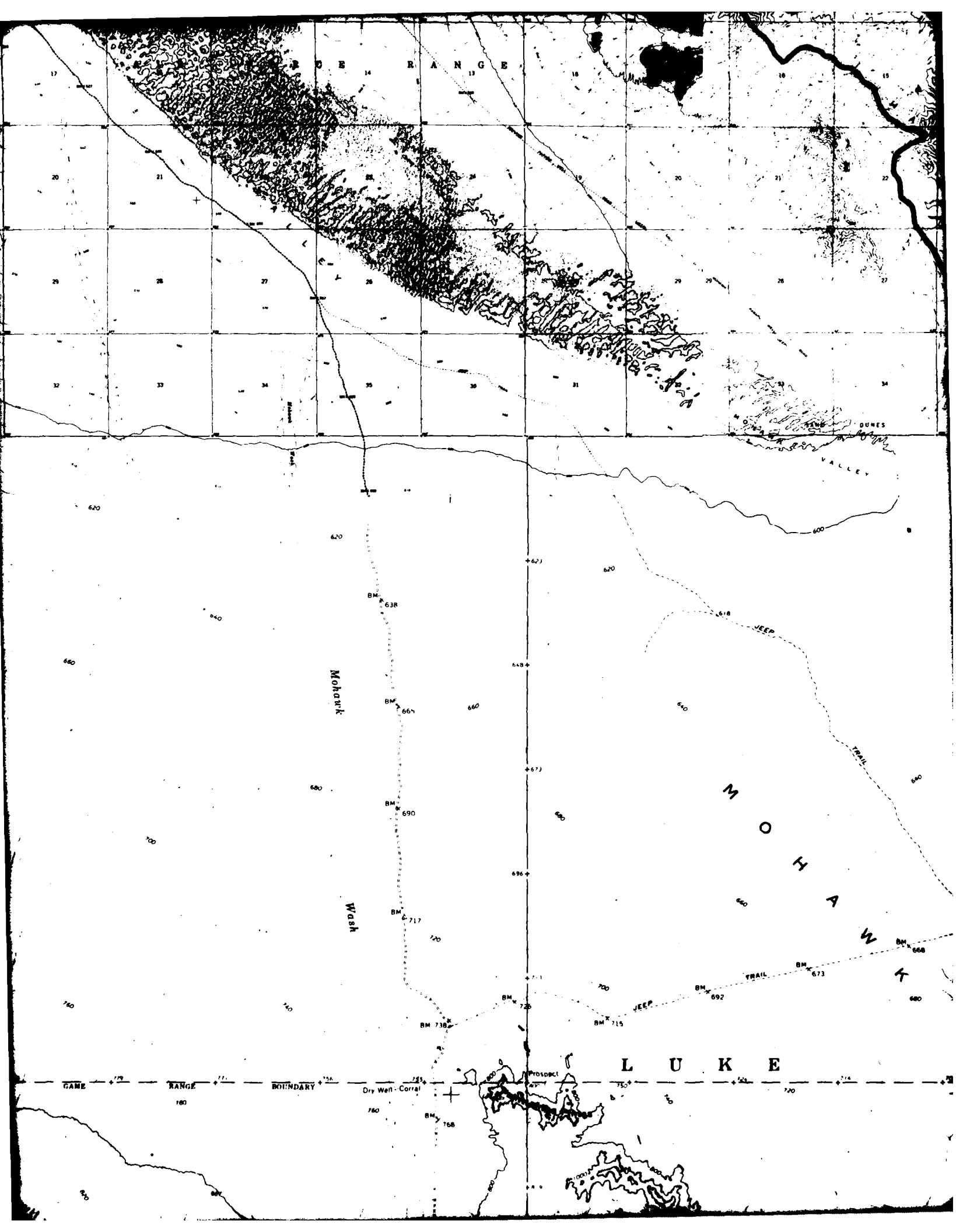

C-08-14-16dda
320
STOVAL FIELD
C-08-13-21ddd
329
C-08-13-28baa
330
SC-D-1
C-08-14-26cdc
316
C-08-13-30ccd
SC-H-2
335
320
C-08-13-34adb
332
A I R
A R F O R C E R A N G E
340
350
330
340
350
C-09-13-27cba
L U K E

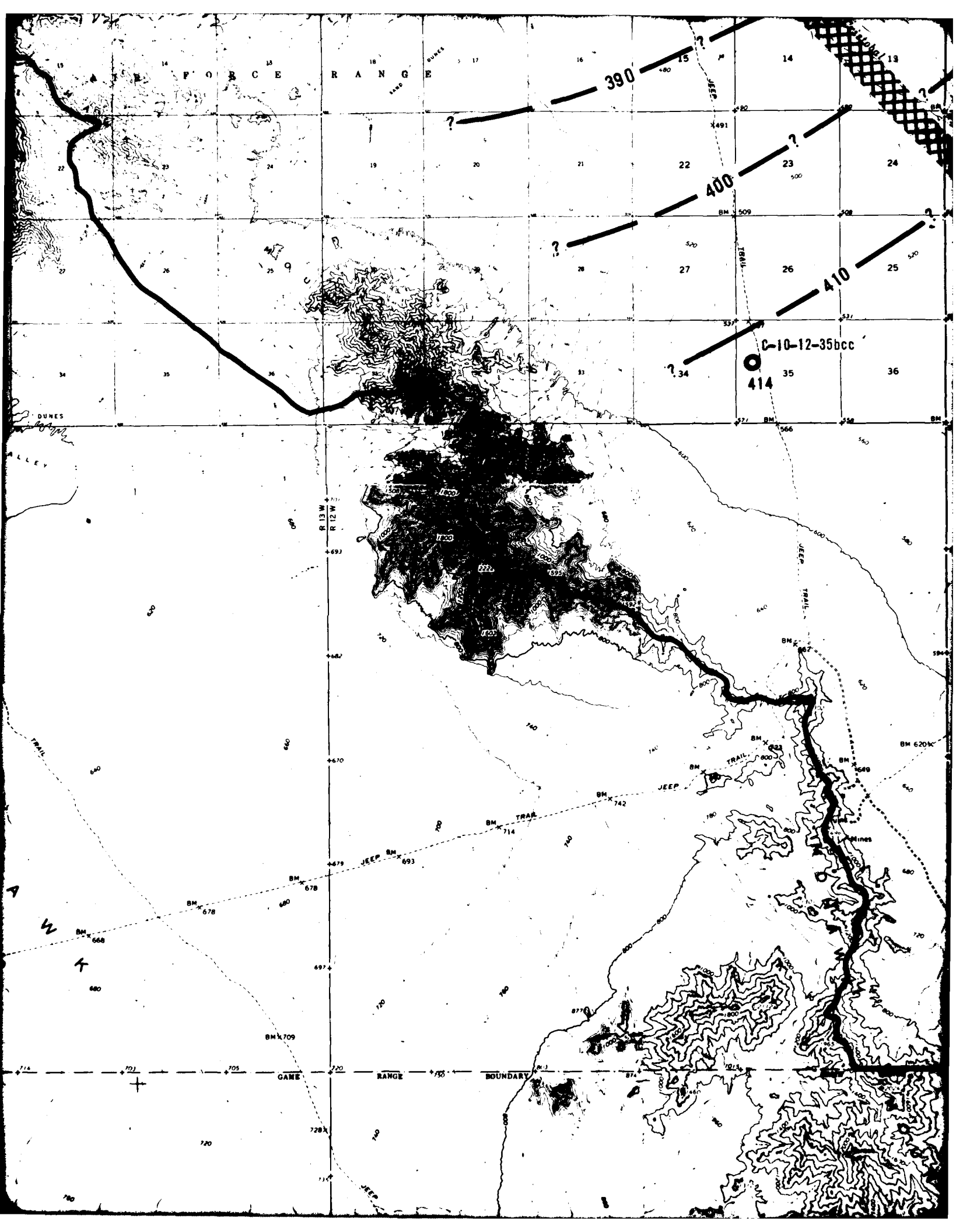

C-08-13-34adb
LUKE
AIR FORCE RANGE
350
C-09-13-12bdb
360
363
C-08-13-12ccd
370
C-09-12-17dac
382
380
380
395
C-09-12-28baa
350
360
C-10-12-6abb
C-10-12-8-aab
368
370
380
390
SAN CRISTOBAL
SAND DUNES
LUKE
AIR FORCE RANGE

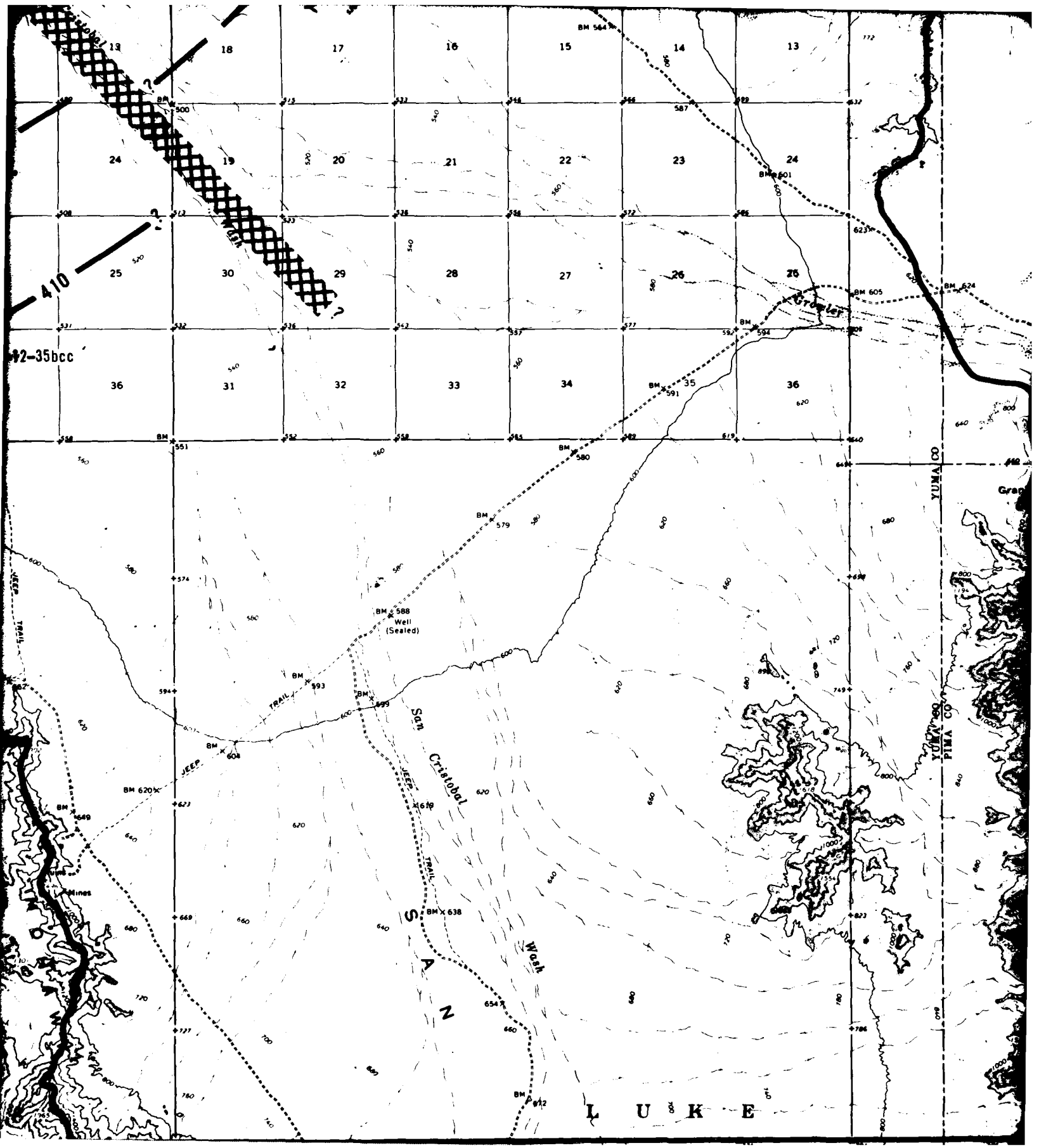

C-09-11-31ccc
405
CRISTOBAL
AIR FORCE
MOUNTAINS
VALLEY
Natural Tank
Tank
BM 520
BM 564

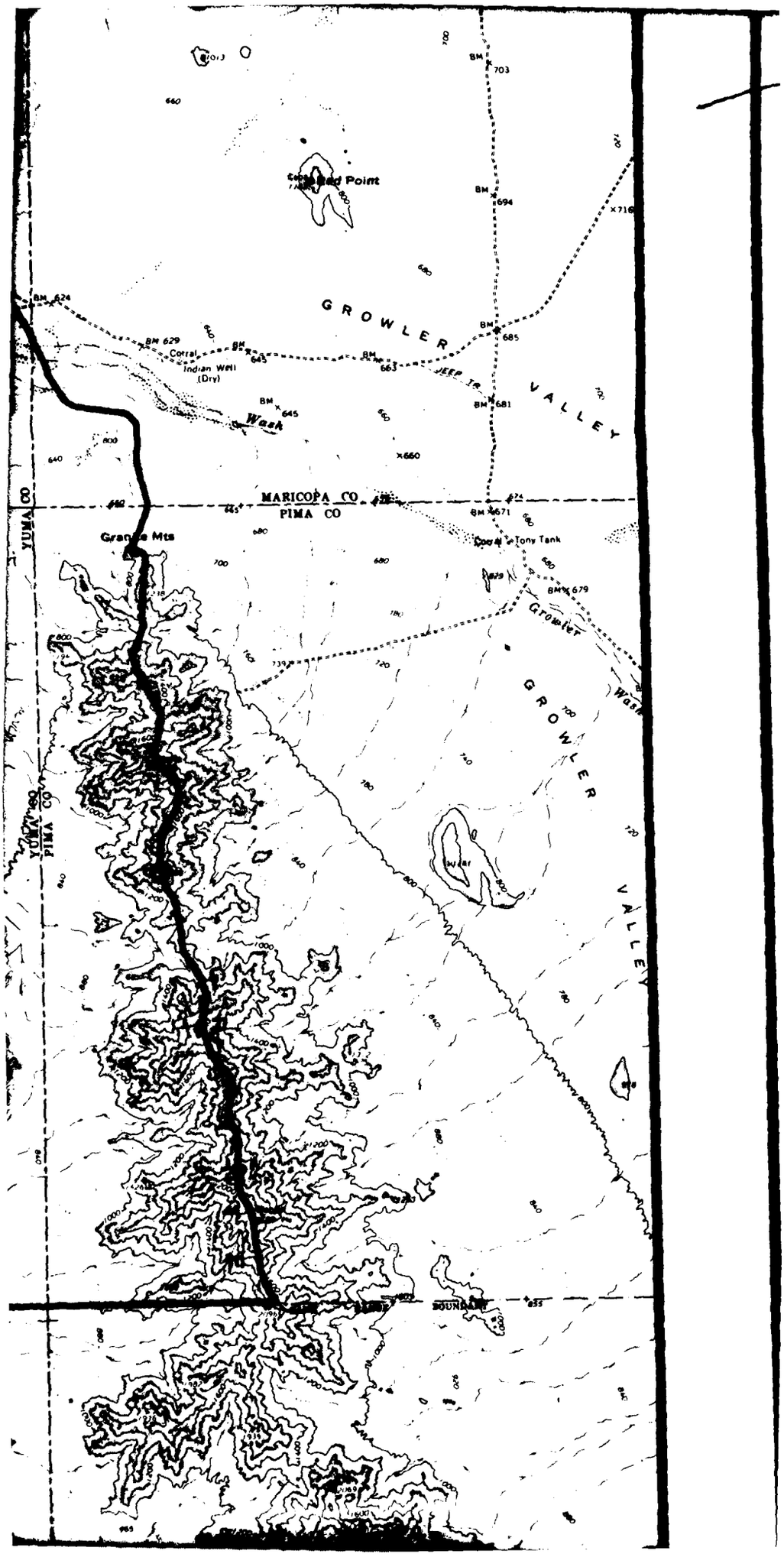

F O R C E
M O U N T A I N S
Natural Tank
Eagle Tank
BM 642
BM 663
BM 683
BM 664
BM 703
BM 710
BM 750
BM 714
BM 752
BM 723
BM 731
BM 735
BM 713
BM 705
BM 703
BM 564

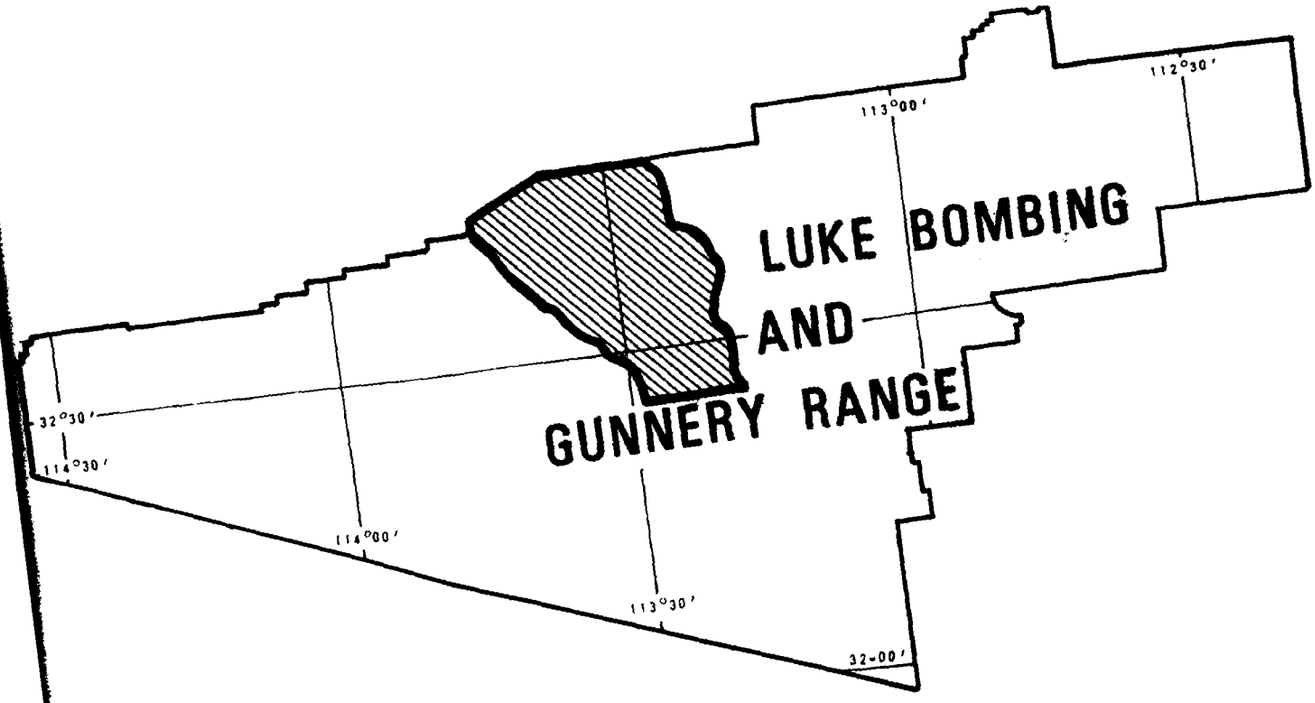

AIR FORCE RANGE
MOHAWK VALLEY
R15W
R14W
JEEP TRAIL
GAME RANGE BOUNDARY
GAME

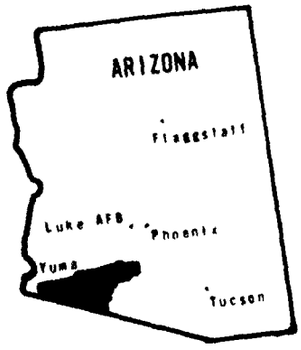

DE RANGE
DUNES
VALLEY
JEEP
TRAIL
Mohawk
Wash
M O H A W K
L U K E
GAME
RANGE
BOUNDARY
Dry Well - Corral
Prospect
BM 638
BM 664
BM 690
BM 717
BM 738
BM 720
BM 715
BM 692
BM 673
BM 668
BM 768


A I R F O R C E R A N G E
390
400
410
C-10-12-35bcc
414
R 13 W
R 12 W
GAME RANGE BOUNDARY
JEEP TRAIL
DUNES


410
12-35bcc
Trailer
BM 605
BM 624
BM 564
BM 601
BM 591
BM 580
BM 579
BM 588
Well
(Sealed)
BM 593
BM 599
BM 604
BM 620
BM 649
BM 638
BM 612
TRAIL
JEEP
San Cristobal
Wash
Mines
YUMA CO
YUMA CO
SAN
L U K E

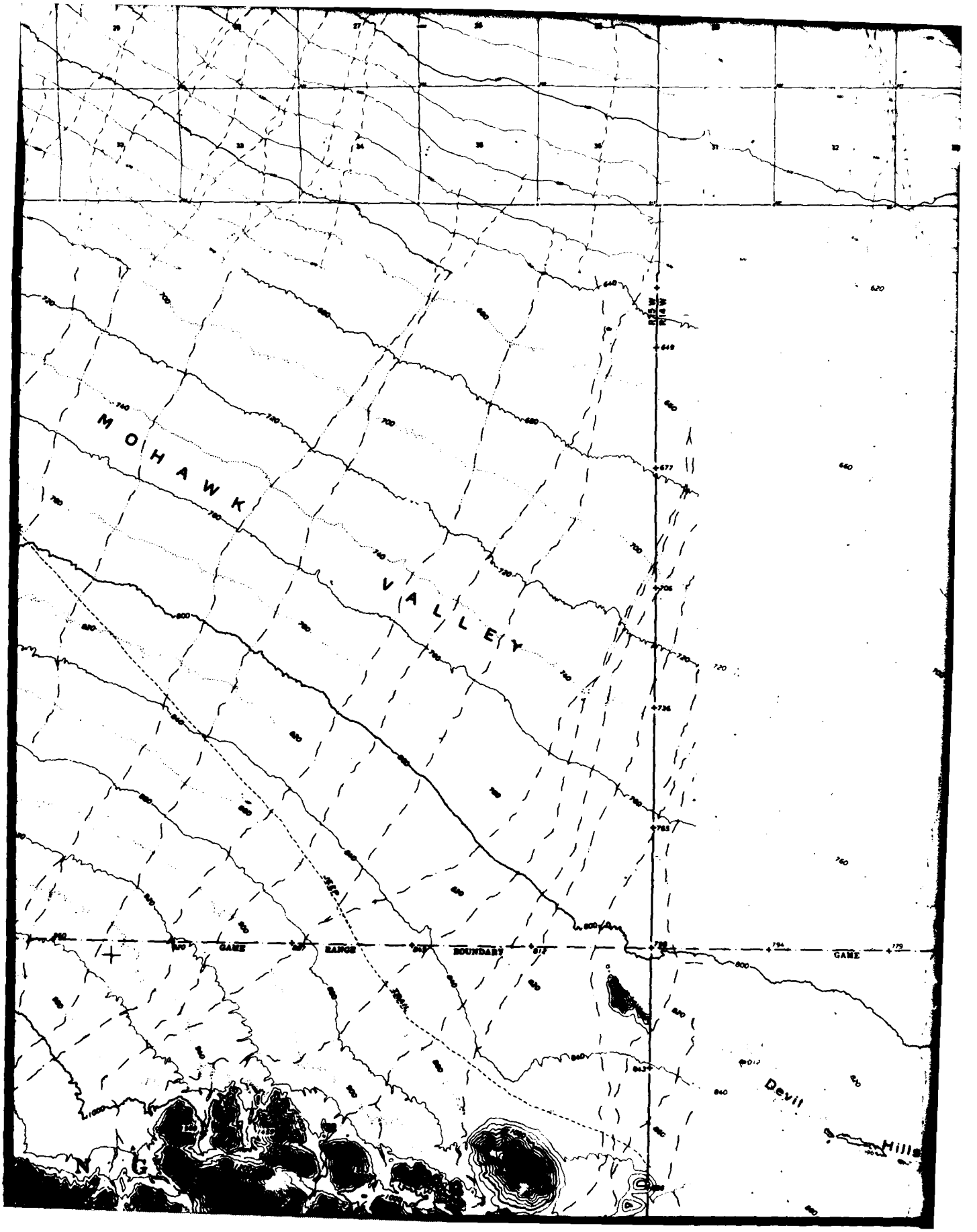

GROWLER VALLEY
MARICOPA CO
PIMA CO
YUMA CO
Granite Mts
Corral
Indian Well (Dry)
Wash
Tony Tank
Growler
Wash
GROWLER VALLEY
YUMA CO
PIMA CO
BOUNDARY

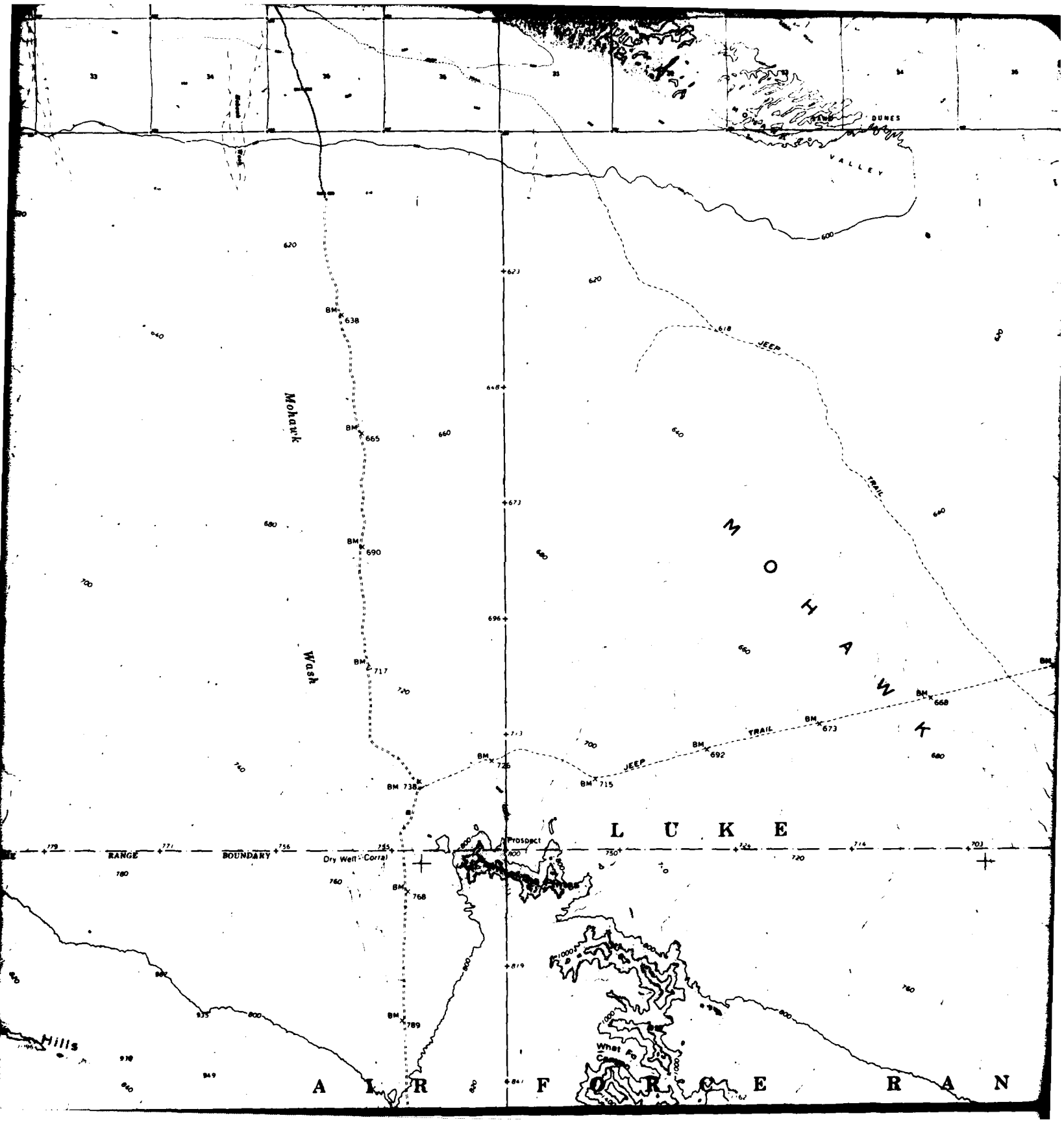


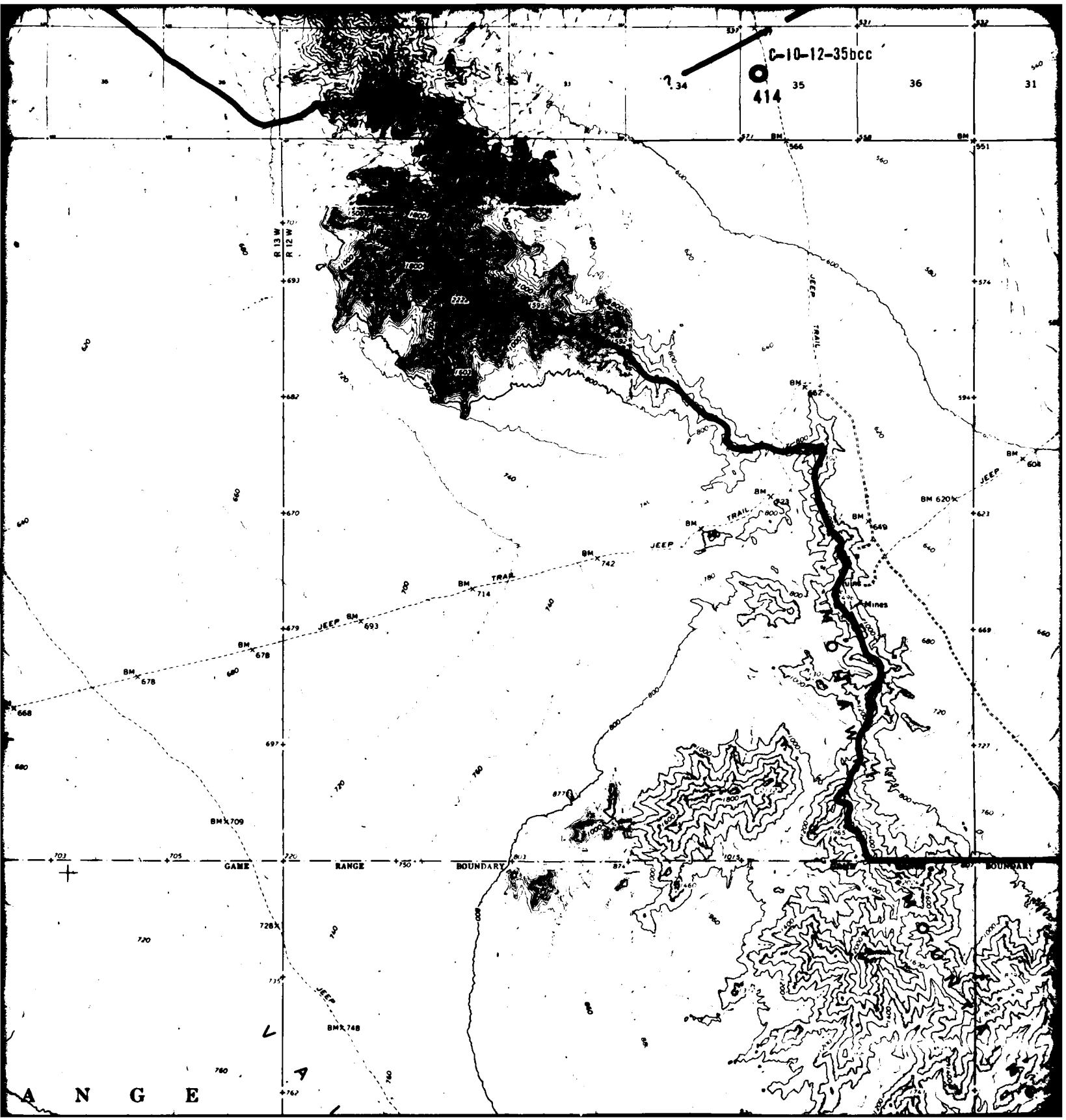


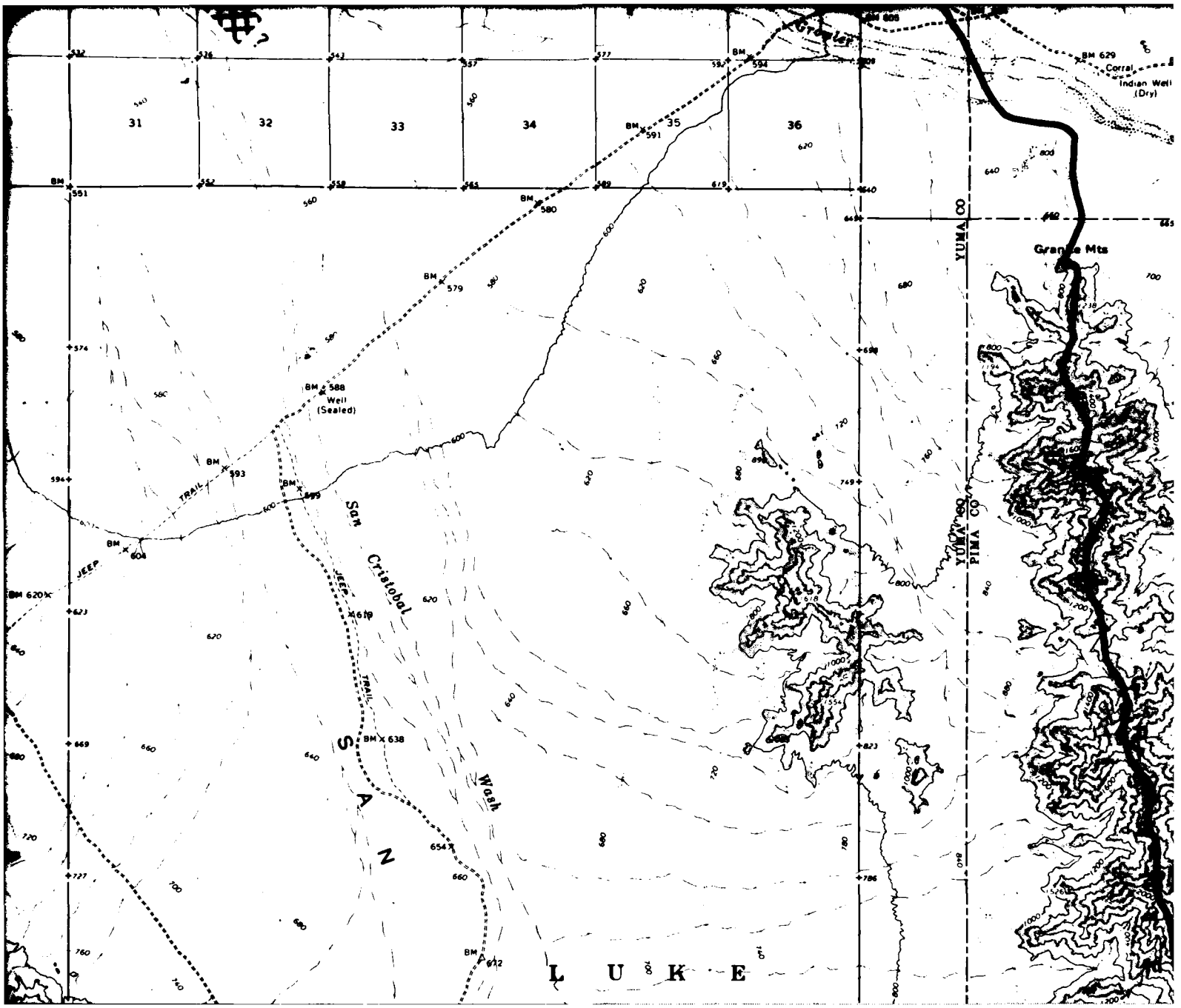
WELL LOCATION MAP AND LINES OF EQUAL ELEVATION
OF GROUND WATER IN WELLS, JULY 1977
SAN CRISTOBAL VALLEY, ARIZONA

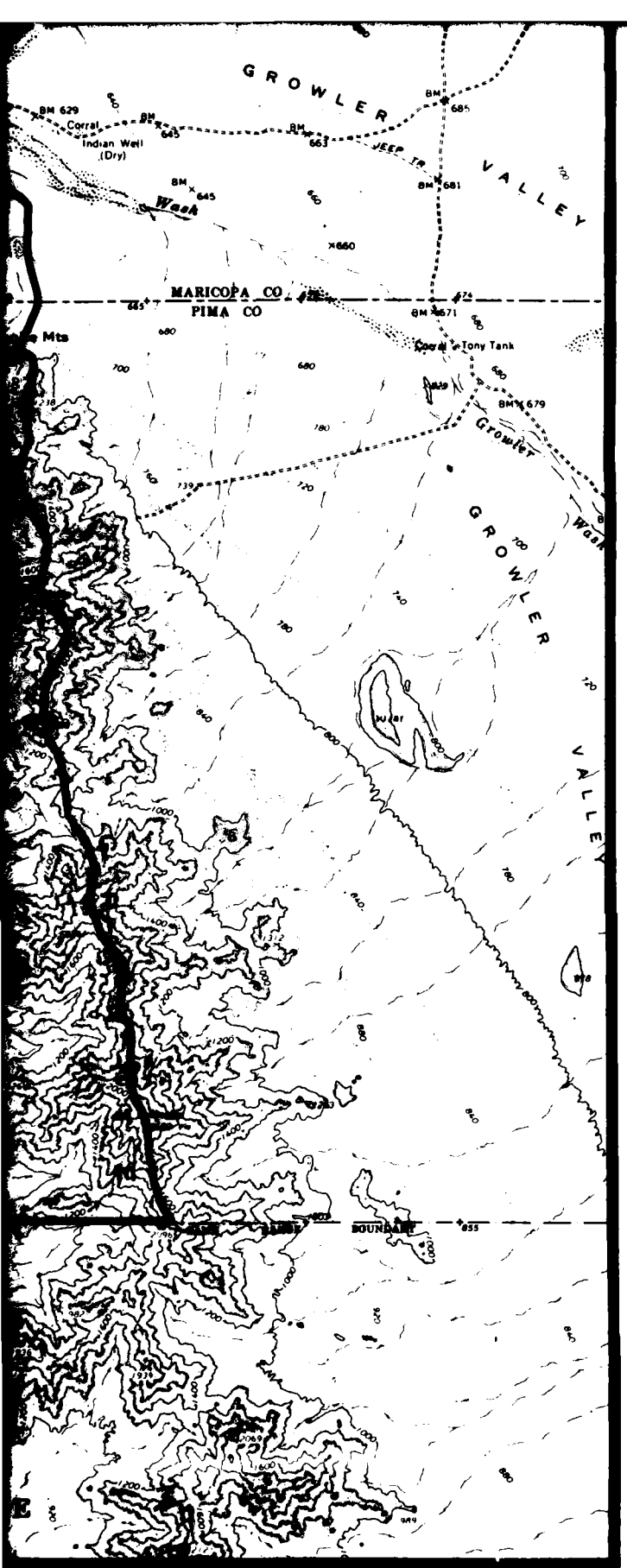
DRAWING

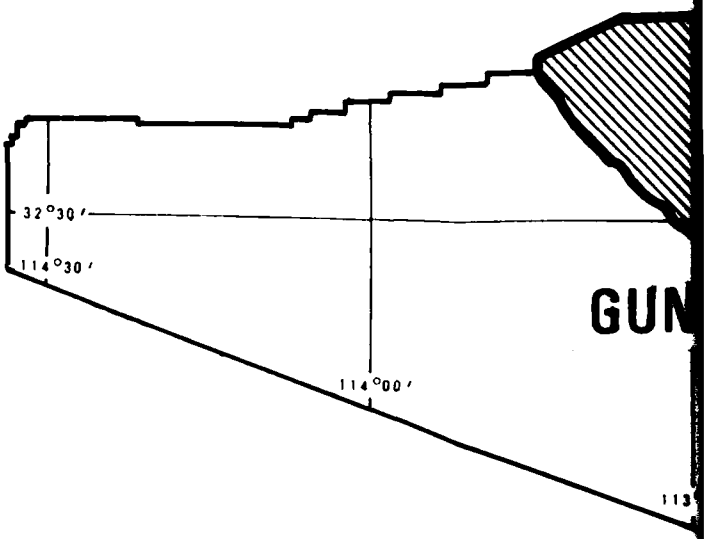

MOHAWK
VALLEY
GAME
RANGE
BOUNDARY
GAME
Devil
Hills
N. C.

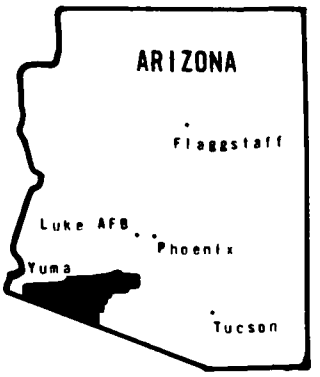

DUNES
VALLEY
JEEP
TRAIL
Mohawk
Wash
MOHAWK
LUKE
RANGE BOUNDARY
Dry Well - Corral
Prospect
What Is
Hills
AIR FORCE RAN
BM 638
BM 665
BM 690
BM 717
BM 738
BM 728
BM 715
BM 692
BM 673
BM 668
BM 768
BM 789


C-10-12-35bcc
414
34
35
36
31
R 13 W
R 12 W
JEEP TRAIL
BM 742
BM 714
BM 693
BM 678
BM 709
BM 748
BM 620
Mines
GAME RANGE BOUNDARY
BOUNDARY
A N G E


31
32
33
34
35
36
Crawler
BM 629
Corral
Indian Well
(Dry)
YUMA CO
PIMA CO
Granite Mts
BM 588
Well
(Sealed)
TRAIL
JEEP
San Cristobal
Wash
SAN
LUKE

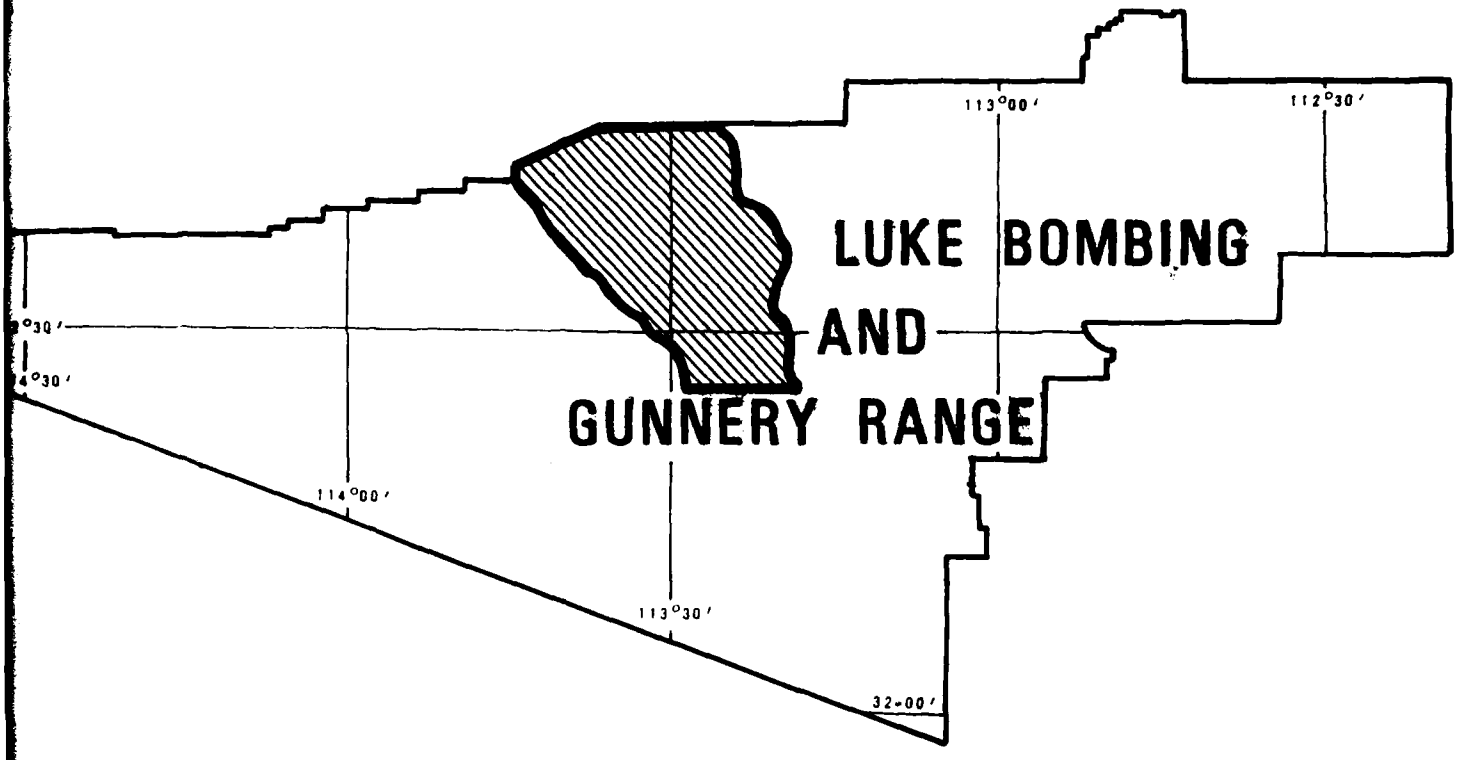

GROWLER
VALLEY
MARICOPA CO
PIMA CO
Corral
Indian Well
(Dry)
Tony Tank
Growler
Wash
BM 629
BM 645
BM 663
BM 685
BM 681
BM 671
BM 679
Mts
BOUNDARY

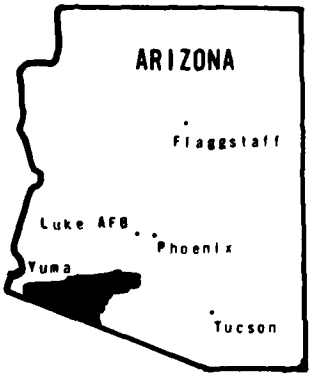

32°30'
114°30'
114°00'
GUN


ARIZONA
Flagstaff
Luke AFB
Phoenix
Yuma
Tucson

16

22





WELL LOCATION MAP AND LINES OF EQUAL ELEVATION
OF GROUND WATER IN WELLS, JULY 1977
SAN CRISTOBAL VALLEY, ARIZONA

MX SITING INVESTIGATION
DEPARTMENT OF THE AIR FORCE - SAMSO

DRAWING
5.1-D

FUGRO NATIONAL, INC.


DA1
FILM